Coll H02572-32-P028979

THE ACCOUNTING REVIEW

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01.07.05

VOLUME 80, No. 1 JANUARY 2005

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The Accounting Review (ISSN 0001-4826) is published four times a year in January, April, July, and October by the American Accounting Association, 5717 Bessie Drive, Sarasota, Florida 34233-2399. General subscriptions are available at the annual rate of U.S. $225; membership subscription rate is $25 with discounts available; and emeritus subscription rate is $8.75. Periodical postage paid at Sarasota, Florida and additional mailing offices. **POSTMASTER:** Send address change to ***The Accounting Review,*** 5717 Bessie Drive, Sarasota, Florida 34233-2399.

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p28979

THE ACCOUNTING REVIEW

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
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Capital Market Pressure, Disclosure Frequency-Induced Earnings/Cash Flow Conflict, and Managerial Myopia

Sanjeev Bhojraj
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ABSTRACT: We examine the effects of increased capital market pressure and disclosure frequency-induced earnings/cash flow conflict on myopic behavior. In our experiments, experienced financial managers choose between projects where a conflict exists between near-term earnings and total cash flow. Managers more often choose projects that they believe will maximize short-term earnings (and price) as opposed to total cash flows in response to increased capital market pressure resulting from a pending stock issuance, holding constant agency frictions and other stock market pressures. When faced with increased capital market pressure, changes in disclosure frequency cause managers to behave more or less myopically depending on the impact of the change on the pattern of earnings and the resulting earnings/cash flow conflict. Our study provides insights into managers' beliefs about stock market pressures, mandatory reporting, and the availability of alternative communications channels, and contributes to literature on managerial myopia and earnings management, as well as current debates over disclosure frequency.

Keywords: *managerial myopia; capital market pressures; financial reporting; disclosure frequency.*

Data Availability: *Contact authors.*

I. INTRODUCTION

We examine whether managers behave myopically in response to increased capital market pressure, controlling for agency frictions between the manager and existing stockholders. We also examine whether the prevalence of myopia is affected by disclosure frequency. In our setting, myopic behavior strictly refers to giving up projects with greater cash flows to report externally higher near-term earnings. Prior theoretical work (Stein 1989; Bar-Gill and Bebchuk 2003) suggests that the degree of myopic behavior will be influenced by capital market incentives that determine the extent to which managers care about short-term price relative to long-term value, even in the absence of

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We thank Robert Bloomfield, Joel Demski, Tom Dyckman, Paul Hribar, Jim Hunton, Charles Lee, Mark Nelson, Nick Seybert, and seminar participants at Cornell University, the FARS Doctoral Consortium, the AAA Doctoral Consortium, and McMaster University for their feedback.

Editor's note: This paper was accepted by S. Jane Kennedy, Editor.

Submitted October 2003
Accepted June 2004

agency frictions.[1] However, prior empirical work has not directly documented such effects. In addition, in past and current debates over mandatory disclosure frequency, many have claimed that increases in disclosure frequency will increase myopic behavior, but prior theoretical or empirical work has not tested this assertion. This issue is at the heart of the debate in the EU, Japan, Hong Kong, and Singapore where policy makers are considering moving from a semiannual disclosure requirement to a quarterly requirement.[2]

We examine these issues in an experimental setting where we manipulate the degree of market pressure faced by the manager (high and low likelihood of a stock issuance), the frequency of mandatory external reporting (semiannual versus quarterly reporting), and the pattern of earnings generated by alternative investment projects, controlling for sources of agency frictions and other stock market pressures. Since our purpose is to gain insight into what managers learn in the field about stock market incentives and financial reporting, 89 experienced financial managers from 19 public companies participate in our study. Our approach is most similar to Cloyd et al. (1996) who solicit managers' beliefs about the importance of tax and book conformance at public versus private firms and Kennedy et al. (1998) who study managers' and others' beliefs about the meaning of alternative liability disclosures.[3]

The managers are presented with two projects, one with higher total cash flows but lower short-term earnings (henceforth the high-cash-flow project) and one project with lower total cash flows but higher short-term earnings (henceforth the low-cash-flow project). The managers choose the project to implement and disclose externally based on the market pressure and disclosure frequency conditions to which they are assigned and the beliefs they bring to the experiment about stock market incentives, mandatory accounting reports, and the availability of alternative communications channels. We further manipulate the earnings patterns expected from the two projects between our two experiments. In the first experiment, mandatory quarterly reports make the high-cash-flow project look more negative than semiannual reports at the time of the expected stock issuance. In the second experiment, mandatory semiannual reports make the high-cash-flow project look more negative than quarterly reports at that point in time.

Our study contributes to literature on managerial myopia, earnings management, and disclosure frequency. Prior empirical research has focused on myopic behavior resulting from agency frictions (e.g., Dechow and Sloan 1991) and earnings management resulting from capital market pressure (e.g., Teoh et al. 1998). We contribute to the myopia literature, and complement existing empirical work, by specifically identifying a causal link between capital market pressure and myopic behavior. Consistent with Stein (1989) and Bar-Gill and Bebchuk (2003), we document that, controlling for agency frictions, managers will make more myopic project choices in response to increased stock market pressure; in response to a pending stock issuance, they more often choose projects that they believe will maximize short-term earnings (and price) as opposed to total earnings.[4] This is the first direct evidence of myopic behavior that is not driven by additional agency frictions between the manager and existing stockholders. These findings also contribute to the literature on earnings management, which suggests that managers tend to manipulate earnings numbers in order to meet short-term financial reporting goals. The difference in our study (as in all of the myopia literature) is that real cash flow sacrifices are differentiated from pure accounting manipulations.

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[1] While the term managerial myopia may conjure up images of managerial "opportunism," i.e., activities in the interests of the manager and detrimental to the interests of the existing shareholders, this need not be the case and is not the case in our study. For example, if a firm is planning to issue stock, then myopic behavior could protect existing shareholders from dilution that could result if the high-cash-flow project is chosen.

[2] See the Appendix for some examples.

[3] Libby et al. (2002, 802) discuss the appropriateness of use of experienced participants when the purpose of the experiment is to "peer into the minds" of specific groups of experienced professionals to determine what they have learned about relevant concepts and events and how that learning affects decisions."

[4] In our study (as in Stein 1989), total cash flow from a project equals the total earnings from that project, by design.

We also contribute to the literatures on myopia and disclosure frequency by providing the first empirical demonstration of the relation between the two factors. We find that the effect of change in disclosure frequency depends on the impact of the change on the pattern of earnings disclosed and the level of capital market pressure. Our results suggest that under normal circumstances (i.e., in the absence of particularly strong capital market pressures) a change from semiannual to quarterly reporting is unlikely to have large effects on managers' investment choices. In our experiment, managers are unwilling to sacrifice 7.5 percent of cash flows for the related disclosure gains. However, when faced with strong capital market pressure resulting from a stock issuance, managers behave more myopically in the quarterly disclosure regime when quarterly reports increase the conflict between near-term earnings and total cash flows, and exhibit the opposite behavior when quarterly reports reduce that conflict. The overall effect of a change in disclosure frequency on myopia will depend on the relative likelihood of the two settings, which is an empirical question. Because of the natural smoothing resulting from longer reporting periods, we expect that, on average, more frequent disclosure could cause greater myopia in the presence of significant added stock market pressure. This should be of interest to policy makers because it provides systematic empirical evidence of the effect of disclosure frequency on myopia. Prior evidence in this regard is primarily anecdotal.[5]

These findings also indicate managers believe that, in the absence of mandatory reports, they are unable to credibly communicate information about the choice of project and long-term cash flows to investors through alternative channels, or they are unwilling to do so. The use of experienced financial managers is of vital importance to our project since it provides insights into the beliefs of people intimately involved with financial decisions and the disclosure process. This highlights the importance and severity of the information communication problem. The results should be of interest to regulators since they indicate potential suboptimal resource allocation.

The remainder of the paper is organized as follows: Section II discusses the relevant literature and develops our hypotheses. In Section III, we outline the basic structure of our experiments. Sections IV and V present method and results for each of our two experiments. We conclude the paper in Section VI.

II. LITERATURE AND HYPOTHESES

Capital Market Incentives and Myopia

Following Stein (1989), we define managerial myopia as the desire to achieve a high current stock price by inflating current earnings at the expense of longer-term cash flows (or earnings). Prior accounting research on the effects of capital market pressure has focused on its effects on earnings management. For example, Teoh et al. (1998) find that IPO firms adopt more income-increasing depreciation policies and provide significantly less for uncollectible accounts receivable (see Healy and Wahlen [1999] for a survey of these papers).[6] Empirical studies of myopic behavior have focused mainly on R&D expenditures. This stream of research tends to view myopic behavior as reflecting managerial opportunism (where managers take actions that are detrimental to the interests of the shareholders). For example, Dechow and Sloan (1991) and Baber et al. (1991) focus on identifying settings in which managers are likely to care about near-term earnings (e.g., managers close to retirement, firms likely to incur a loss, etc.) and examine if managers are likely to cut R&D expenditures during this period. Bushee (1998) examines the role that institutional investors play in monitoring managers and mitigating agency frictions and myopic behavior (measured as reduction in R&D expenditure). In a departure from the primary stream of work that focuses on R&D, Graham et al. (2004), using survey data, find that financial executives are willing to give up economic value to meet a short-run earnings target. Along similar lines, Roychowdhury (2003) finds that firms reporting small positive annual earnings have abnormally low cash from operations and abnormally high production costs, providing evidence of manipulation through real activities. However, none of the prior studies test whether myopic behavior can occur after controlling for agency frictions (i.e., when the manager is acting in the interests of the existing shareholders), as is also suggested by the theoretical literature. In this study, we complement existing empirical work by establishing a causal link between a change in capital market pressure and myopic behavior, controlling for agency frictions, and examining the effect of a change in disclosure frequency on myopic behavior.[7]

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[5] In settings where greater disclosure frequency results in lower myopia, firms could choose to voluntarily disclose information regardless of mandatory disclosure frequency, thereby increasing the disclosure frequency. However, our results on myopia suggest that managers are either unable or unwilling to credibly communicate this information through voluntary disclosure.

Stein (1989) shows that, in the face of a rational stock market, managers would sacrifice total cash flows to boost near-term income in an effort to influence the market's current assessment of the firm's value. Along similar lines, Bar-Gill and Bebchuk (2003) model the misreporting of corporate performance when a firm is likely to issue stock and the ability to misreport requires sacrificing cash. These models suggest that the extent of managerial myopia depends on the extent to which managers care about near-term earnings relative to longer-term objectives. Further, this focus on near-term earnings and resulting myopic behavior can occur even when the managers are acting in the interests of existing shareholders.[8]

In the case of a pending stock issuance, myopic behavior can protect the interests of existing shareholders in two ways. First, undervaluation could occur because the choice of the high-cash-flow project would lead to lower short-term earnings and lower expectations about the future. This, in turn, would result in the existing shareholders' value being adversely affected in the event of a stock offering. However, for myopic behavior to increase in this setting, the manager must perceive an inability to credibly communicate information about the future cash flows of the high-cash-flow project through alternative disclosures. Second, managers could behave myopically even if they could credibly communicate information about future cash flows at the time of stock issuance. This occurs if the managers choose not to disclose information about the high-cash-flow alternative because they believe that the valuation that results from choosing and not disclosing additional information about the low-cash-flow project is greater than the valuation from choosing and disclosing additional information about the high-cash-flow project (Bar-Gill and Bebchuk 2003). Managers in this setting might choose the low-cash-flow project and not disclose information on future cash flows, thereby benefiting existing shareholders at the expense of the incoming shareholders.[9] In keeping with the theoretical results of Stein (1989) and Bar-Gill and Bebchuk (2003) we expect that:

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[6] Other studies suggest that managers use accounting methods and accruals in order to meet other short-term goals related to analysts' earnings expectations, bonus targets, prior management forecasts, etc. (e.g., Healy 1985; Jones 1991; Kasznik 1999; Libby and Kinney 2000; Bartov et al. 2002).

[7] Other related work includes Jacobson and Aaker (1993) who examine the effect of degree of information asymmetry between the manager and the market on managerial myopia and Lys and Vincent (1995), who document AT&T's willingness to "burn" cash to obtain short-term earnings benefits.

[8] The term myopia is most often used to reflect agency frictions, i.e., actions by the manager that harm the existing shareholders. In our setting, the term reflects actions by managers that benefit existing shareholders but adversely affect incoming shareholders. Introducing additional agency frictions in this setting could produce myopic behavior that would be to the detriment of existing shareholders.

> **H1:** In the presence of a conflict between near-term earnings and total cash flow, increasing stock market pressure will increase managerial myopia.

Disclosure Frequency and Myopia

The issue of the relative costs and benefits of increasing the frequency of mandated disclosures has been of continuing interest to managers, investors, and policy makers alike. This topic elicited a great deal of interest when the U.S. was considering changing the mandated disclosure interval to a quarterly basis in 1969 (see Wheat Commission Report, SEC 1969). More recently, this issue has surfaced in the EU, Japan, Hong Kong, and Singapore where policy makers are considering changing interim disclosure requirements from semiannual to quarterly. Recent discussions in the U.S. have centered on increasing the disclosure frequency beyond the current quarterly basis. Both the SEC (2000) and the FASB (2000) have recognized the need for more frequent reporting.

The primary argument that proponents make for increased disclosure frequency rests on enhancing timeliness and transparency. Increasing disclosure frequency makes the information more timely, thereby increasing its value to investors. More frequent disclosure is seen as especially important in environments that change rapidly. A key argument against increasing disclosure frequency is that it will promote managerial short-termism or myopia.[10] Opponents suggest that more frequent reporting will force managers to increase their emphasis on even shorter-run performance at the expense of longer-run performance. For example, in the U.K., *Accountancy Magazine* (Evans 2003) suggests that "one of the leading arguments against quarterly reporting is that it places pressure on companies to perform on a more regular basis and produce short-term results, which is encouraging short-termism in the market."

Disclosure frequency is not a widely studied part of the disclosure literature. A few papers including Baginski et al. (2002) and Bhojraj (2003) study factors that influence how frequently firms issue voluntary earnings forecasts. Butler et al. (2003) study the effect of disclosure frequency on the speed that information is impounded in prices. They find evidence suggesting that increasing the frequency of mandated reporting is unlikely to increase the timeliness of information disclosed. Using a sample of 215 financial managers, Hunton et al. (2003), find that the managers believe that increasing mandated disclosure frequency would increase the decision usefulness of financial statements and the quality of earnings.

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[9] In our experiment, the manager must issue stock. In this case, painting an optimistic earnings picture, thereby increasing stock price, always hurts the new shareholders because they receive a smaller portion of the firm, regardless of how the funds generated by the stock issuance are subsequently used.

[10] Three additional arguments made against increased disclosure frequency are: (1) by increasing the frequency of disclosure, while one is gaining on the timeliness dimension, the reliability of the information disclosure is adversely affected. Reliability is further decreased by the fact that these disclosures are not audited; (2) to the extent that there is a demand from the investors for more frequent disclosure, firms can voluntarily do so; and (3) greater disclosure frequency places greater financial burden on reporting companies due to increased reporting costs.

Finally, Bruns (1966) does not find a significant relation between the frequency with which managers *receive* accounting information (as opposed to the frequency of disclosure to others) and the decisions they make. Though widely discussed in the press, prior theoretical and empirical work has not examined the effect of external disclosure frequency on managerial myopia.

The discussion leading up to H1 suggests that managerial myopia is influenced by the extent of capital market pressure and the extent of conflict between total cash flows and near-term earnings. Capital market pressure can result from several factors including the likelihood of stock issuance, probability of takeover, pressure to meet analysts' forecasts, etc. Thus, managers are constantly subjected to these pressures and these pressures vary from period to period. Given these capital market pressures, the effect of disclosure frequency on myopia should depend on its effect on the conflict between total cash flows and reported near-term earnings. When increasing disclosure frequency causes a decrease in the conflict between total cash flows and reported near-term earnings, we should see a decrease in managerial myopia. Similarly, managerial myopia should increase when increasing disclosure frequency causes an increase in the conflict between total cash flows and reported near-term earnings.

Consider a situation where the firm issues stock in the fourth quarter. In a semiannual disclosure environment, the firm will issue only interim information related to the first two quarters prior to the stock issuance. However, in a quarterly disclosure environment, the firm will issue interim information related to the three quarters prior to the issuance. In a semiannual disclosure environment, myopic managers would choose the project that yields higher earnings in the first two quarters; in the quarterly disclosure environment, they would choose the project that yields higher earnings in the first three quarters. Thus, depending on whether there is greater conflict between near-term earnings and total cash flows after three or two quarters, increasing disclosure frequency could lead to more or less myopic behavior. This suggests that, in the presence of additional stock market pressure, an increase in disclosure frequency could either increase or decrease myopic behavior. This leads to our second hypothesis:

> **H2:** Increasing disclosure frequency will increase or reduce managerial myopia caused by an increase in stock market pressure, depending on whether it causes greater or lesser conflict between near-term earnings and total cash flows.

III. EXPERIMENTAL OVERVIEW

Our experiments are designed to test whether managers' propensity to choose projects that will maximize short-term earnings as opposed to total cash flows (managerial myopia) is affected by the degree of stock market pressure and external reporting frequency. This requires that we construct alternative projects that create a conflict between short-term external reporting goals and total cash flows, while controlling other factors that might affect managers' preference between projects.

Each of our experiments presents experienced financial managers of public companies followed by analysts with an investment case where they are advising the CEO of a public company followed by analysts.[11] The case involves selecting from two alternative marketing campaigns. Each is expected to be effective for four quarters and to produce the same sales and gross profit in each quarter. For both alternatives, the company has also arranged to make equal quarterly payments to the vendor (one-quarter of the total amount each quarter), which equalizes the timing of the cash inflows and outflows across the alternatives. Holding constant the pattern of cash flows across the two project choices is important because it equalizes the cash flow risk between the alternatives and ensures a match between the direction of differences in total cash flows and differences in the present value of total cash flows.[12] The two alternatives differ in two ways. First, they are expected to have different total costs, so they will generate different total cash flows and earnings. Second, because of differences in the timing of expense recognition related to the campaigns, they are expected to produce different earnings patterns over the interim periods. In all conditions, the managers are presented with internal information including the expected *quarterly* gross profit, selling and general expenses, and income from operations for the two alternatives. Alternative One is always the myopic choice.

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[11] We chose to put the financial managers in the position of advisors to the CEO rather than the CEO themselves to minimize decisions driven by self-interest. By acting as advisors they are further distanced from potential agency frictions between the CEO and the stockholders.

In each experiment, two factors are varied between subjects: (1) stock market pressure and (2) frequency of reporting. To vary stock market pressure, we manipulate whether the company anticipates issuing additional shares through a secondary stock offering during the fourth quarter of the year.[13] As stated earlier, capital market pressure can result from several factors including the likelihood of stock issuance, probability of takeover, pressure to meet analysts' forecasts, etc., which suggests that managers are constantly subjected to these pressures. We vary the level of stock market pressure by adding the stock issuance because of its focus in the theoretical literature as a source of pressure that is likely to result in myopic behavior that is in the interests of existing shareholders (Bar-Gill and Bebchuk 2003), as well as its discrete nature. Other operationalizations such as pressure to meet analysts' forecasts have complex multiperiod effects that are not well understood (e.g., beating this period's forecast may make it harder to beat the next period's forecast) and are also naturally related to other incentives which may cause managers to take actions that are not in the interests of shareholders (e.g., related to bonuses, etc.).[14]

The no-stock issuance condition serves a vital role as a control group, because myopic behavior driven by factors other than the stock issuance (other stock market pressures or agency frictions) should manifest in this condition, allowing us to isolate the incremental effect of the stock issuance (the additional capital market pressure) on managerial myopia. In other words, if the myopia we observe is primarily caused by agency frictions such as those related to internal performance evaluation or other stock market pressures besides those related to stock issuance, we should observe the same degree of myopic behavior in both the no stock issuance and stock issuance conditions. For example, if all participants assume that they are being evaluated based on external reporting and therefore make their decisions to increase manager wealth (agency considerations), then their incentives should manifest in the no stock issuance setting, which acts as our control group.[15]

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[12] Alternative Two always has higher total cash flows and higher net present value. Though the cash-flow risk of the two projects is exactly the same, the alternatives are designed such that even if the subjects focused on earnings and mistook them for cash flows, it would take a very high discount factor for the perceived NPV of Alternative One to exceed that of Alternative Two (55 percent discount rate in Experiment One and 73 percent discount rate in Experiment Two).

[13] Note that the manager does not determine whether there will be a stock issuance. S/he only chooses between the investment alternatives.

[14] A stock issuance is a relatively low frequency cause of stock market pressure. However, theory suggests that the results should generalize to any manipulation that successfully varies stock market pressure.

To vary frequency of reporting, we manipulate whether the company is listed on a stock exchange that requires quarterly or semiannual interim reports. Each participating manager then selects between the two alternatives, based on the quarterly internal information about expected results (held constant) and the pro forma quarterly or semiannual statements of earnings expected to result from each of the two alternatives. Participants are assigned randomly to treatments.

IV. EXPERIMENT ONE

Materials and Procedures

As noted above, participants are presented with two alternatives that differ in total expense to be recognized and pattern of expense recognition in a manner that creates a conflict between shorter-run financial reporting objectives and total cash flows. In this first experiment, the values are selected such that, during the fourth quarter when any secondary share offering would be made, high-cash-flow Alternative Two looks inferior to low-cash-flow Alternative One when quarterly reports are issued, but not when viewed through semiannual reports. This is accomplished in Experiment One by choosing amounts such that Alternative Two would result in 7.5 percent higher total earnings and cash flows for the year, but lower, more irregular earnings to date and for the immediate prior quarter when observed during the fourth quarter.[16] The *internal* information on the expected results from the two alternatives is depicted below:

Alternative One	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total**
Gross profit	3,200	3,200	3,200	3,200	12,800
Selling and general expenses	2,200	2,200	2,200	2,200	8,800
Income from operations	1,000	1,000	1,000	1,000	4,000

Alternative Two	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total**
Gross profit	3,200	3,200	3,200	3,200	12,800
Selling and general expenses	3,300	950	3,300	950	8,500
Income from operations	(100)	2,250	(100)	2,250	4,300

All subjects in the four experimental conditions see the same expected quarterly *internal* information.

Subjects also see the *external* reports expected to result from each investment alternative. The external reports expected in the quarterly and semiannual reporting conditions are presented in Figure 1, Panels A and B. The shading indicates the period that will not be visible to the stock market at the time of the stock issuance. The unshaded portions of Figure 1 illustrate that the superiority of Alternative Two is *visible* to the stock market at the time of the stock issuance (the fourth quarter) ***in the semiannual setting***, but not in the quarterly setting.

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[15] This still leaves open the possibility that additional personal benefits may accrue to the manager as a result of a more successful stock issuance. For example, the manager's compensation may be tied to the success of the stock issuance. We acknowledge this possibility. However, these personal benefits are likely to motivate the managers to act in a manner consistent with the current shareholders' interests.

[16] We purposely create a number of differences between the two alternatives after three quarters to increase the chances that we can generate the effect of interest. It is not our purpose to determine the exact reason why Alternative Two might or might not be preferred (lack of smoothness, lower income to date, lower most recent period earnings, the existence of losses, etc.), but to test the effects of stock market incentives and disclosure frequency on that preference. It is important to reemphasize that cash flows are smooth for both alternatives.

Page One of the experimental materials requests participants' cooperation. Page Two explains the setting, describes the elements of the projects that are held constant, presents the quarterly internal information, and indicates whether the company publishes external interim quarterly or semiannual reports and whether a secondary share issuance in the fourth quarter is anticipated (the levels of the two independent variables). Page Three presents the two pro forma income statements indicating the expected amounts to be reported to shareholders for each alternative and asks participants to select an alternative and indicate their strength of preference on a seven-point scale. Page Four asks participants not to refer back to prior pages and includes debriefing questions. These include questions on: (1) the rationale behind their selection,[17] (2) which project they believe will result in the highest

FIGURE 1
Experiment One: Pro Forma External Reports Expected to Result from Each Investment Alternative

Panel A: Quarterly Reporting Condition

Presented below are ***two sets of pro forma financial statements*** indicating the expected amounts to be reported to shareholders if the company chooses each of the two alternatives. ***Please examine and compare them carefully. Then make your choice considering these statements and the facts presented on the prior page.***

Alternative One					
Statement of Earnings (in $000)					
		Quarter 1	Quarter 2	Quarter 3	Quarter 4
Net sales		$6,000	$6,000	$6,000	$6,000
Less: Cost of goods sold		2,800	2,800	2,800	2,800
Gross profit		3,200	3,200	3,200	3,200
Selling and general expenses		2,200	2,200	2,200	2,200
Income from operations		1,000	1,000	1,000	1,000
Alternative Two					
Statement of Earnings (in $000)					
		Quarter 1	Quarter 2	Quarter 3	Quarter 4
Net sales		$6,000	$6,000	$6,000	$6,000
Less: Cost of goods sold		2,800	2,800	2,800	2,800
Gross profit		3,200	3,200	3,200	3,200
Selling and general expenses		3,300	950	3,300	950
Income from operations		(100)	2,250	(100)	2,250

The fourth quarter is shaded here, but not in the instrument, to illustrate the period that would not be disclosed at the time of the stock issuance.

(*continued on next page*)

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[17] Useable responses did not result from this question, and it is not discussed further in the paper.

FIGURE 1 (continued)

Panel B: Semiannual Reporting Condition

Presented below are ***two sets of pro forma financial statements*** indicating the expected amounts to be reported to shareholders if the company chooses each of the two alternatives. ***Please examine and compare them carefully. Then make your choice considering these statements and the facts presented on the prior page.***

Alternative One			
Statement of Earnings (in $000)			
		1st Half	2nd Half
Net sales		$12,000	$12,000
Less: Cost of goods sold		5,600	5,600
Gross profit		6,400	6,400
Selling and general expenses		4,400	4,400
Income from operations		2,000	2,000
Alternative Two			
Statement of Earnings (in $000)			
		1st Half	2nd Half
Net sales		$12,000	$12,000
Less: Cost of goods sold		5,600	5,600
Gross profit		6,400	6,400
Selling and general expenses		4,250	4,250
Income from operations		2,150	2,150

The second half is shaded here, but not in the instrument, to illustrate the period that would not be disclosed at the time of the stock issuance.

stock price in November,[18] (3) whether interim reports to shareholders are issued quarterly or semiannually, and (4) whether shares are to be issued in the fourth quarter. The latter two questions serve as manipulation checks. Background questions are administered before completion of the instrument.

Participants

Our participants in Experiment One are 44 experienced financial managers (mean business experience = 16.1 years; mean accounting/financial experience = 15.1 years) from six publicly traded companies followed by financial analysts (median assets = $11 billion). The companies include an airline, a bank, a hotel chain, a publisher, a manufacturer, and an information technology company. Job titles range from CFO (4) to Assistant Plant Controller (2). Fifty-nine percent of the participants are CPAs, 25 percent are CFAs, and

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[18] The responses to this question are highly correlated with the main dependent variable and are not discussed further.

16 percent CMAs. On average, 30 percent of their wealth is tied up in company stock. Anonymity for the individuals and firms is guaranteed. The experimental sessions, which take place during a training program, last about 20 minutes.

Results

All participants answered the two manipulation check questions correctly. Participant preferences for the two projects are measured by coding their choices as "−" for Alternative One and "+" for Alternative Two and combining them with the seven-point strength-of-preference scale to produce a 14-point-interval scale ranging from −13 to +13 in intervals of two.[19] Participants mean preference scores, standard deviations and choices by treatment combination are presented in Table 1, Panel A (and the means are graphed in Figure 3, Panel A). The overall analysis of variance is presented in Table 1, Panel B, while the simple main effects tests are presented in Panel C. The two main effects as well as the interaction are highly significant.

Hypothesis 1 suggests that, in the presence of a conflict between near-term reported earnings and total cash flow, managerial myopia will be greater when a firm anticipates issuing stock in the near future. In Experiment One, there is a conflict between near-term reported earnings and total cash flow in the quarterly reporting setting. Thus, the hypothesis can be tested by comparing the managers' weighted preferences between those facing the need to issue stock in the fourth quarter and those without that additional capital market incentive in the quarterly setting. The difference in weighted preferences is highly significant ($F = 160.9$, $p = .000$).[20] When there is no pending stock issuance, 10 of 11 participants select Alternative Two, which has lower year-to-date earnings, but higher total cash flows. However, consistent with Stein, when the pending stock issuance is added in the fourth quarter, 11 of 11 participants select Alternative One (the myopic choice), which has higher year-to-date earnings, but lower total cash flows. This difference is highly significant (Fisher test, $p < .005$).

Hypothesis 2 suggests that increasing disclosure frequency will increase or reduce managerial myopia caused by an increase in stock market pressure, depending on whether it causes greater or lesser conflict between near-term earnings and total cash flows. In Experiment One, there is greater conflict between near-term earnings and total cash flows after three quarters. Consequently, we should see the stock issuance cause a greater increase in myopic behavior in the quarterly setting than the semiannual setting. As predicted, the difference in weighted preferences caused by the addition of the stock issuance is significantly larger in the quarterly setting than in the semiannual setting ($F = 81.8$, $p = .000$).[21] In the semiannual setting where there is no conflict between near-term earnings and total cash flows, all 11 participants in the no stock issuance condition and in the stock issuance condition choose Alternative Two. In the quarterly setting where there is a conflict between near-term earnings and total cash flows, as indicated above, 10 of 11 participants choose Alternative Two in the no stock issuance condition, whereas in the stock issuance condition 11 of 11 participants choose Alternative One, the myopic alternative. This finding strongly supports the hypothesis. However, to demonstrate that this phenomenon can occur in either a quarterly or a semiannual setting and is not a consequence of more frequent reporting

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[19] A scale of −7 to +7 would not be appropriate because that would cause an interval of two points between −1 to +1. To ensure uniformity of the scale intervals we chose intervals of two.

[20] All p-values are two-tailed.

[21] An analysis of variance using the choices as the dichotomous dependent variable produces the same results.

TABLE 1
Results of Experiment One

The data come from an experiment where 44 experienced financial managers select between two alternative investment projects and indicate their strength of preference. A negative preference score indicates a preference for the higher short-run earnings, lower total cash flows alternative (the myopic choice). A positive preference score indicates a preference for the lower short-run earnings, higher total cash flows alternative. The "Interim Reporting" treatment manipulates whether semiannual or quarterly reports are issued to investors. The "Stock Issuance" treatment manipulates whether a stock issuance is anticipated in the fourth quarter.

Panel A: Mean Managers' Preferences across Conditions (Standard Deviations in parentheses) [# Choosing the Myopic Alternative/Sample Size in Brackets]

	Interim Reporting	
Stock Issuance	**Semiannual**	**Quarterly**
No Stock Issuance	11.9 (1.6) [0/11]	9.7 (7.8) [1/11]
Stock Issuance	12.1 (1.9) [0/11]	−12.5 (0.9) [11/11]

Panel B: Two-Way ANOVA (Effect of Interim Reporting and Stock Issuance)

Source	df	Mean Squares	F-statistic	p-value
Interim Reporting	1	1964	116.8	.000
Stock Issuance	1	1331	79.1	.000
Interim Reporting × Stock Issuance	1	1375	81.8	.000
Error	40	16.8		

Panel C: Simple Main Effects Tests

Simple Main Effects	df	F-statistic	p-value
Stock Issuance at Quarterly	1	160.9	.000
Stock Issuance at Semiannual	1	0.0	.918
Interim Reporting at No Stock Issuance	1	1.6	.219
Interim Reporting at Stock Issuance	1	197.0	.000

per se, this hypothesis must also be tested in a setting where there is greater conflict between near-term earnings and total cash flows after two quarters than after three. Experiment Two provides such a test.

V. EXPERIMENT TWO

Materials and Procedures

As in Experiment One, participants are presented with two alternatives that differ in total expense to be recognized and pattern of expense recognition in a manner that creates a conflict between shorter-run financial reporting objectives and total cash flows. However, in Experiment Two the earnings pattern in Alternative Two is altered so that there is greater conflict between near-term earnings and total cash flows after two quarters than three. This is accomplished by keeping the smooth pattern for Alternative One and creating a pattern where earnings rise for the first three quarters and then fall in the fourth quarter for Alternative Two. The *internal* information presented to all participants on the two alternatives are depicted below:

Alternative One	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total**
Grows profit	3,200	3,200	3,200	3,200	12,800
Selling and general expenses	2,200	2,200	2,200	2,200	8,800
Income from operations	1,000	1,000	1,000	1,000	4,000

Alternative Two	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total**
Gross profit	3,200	3,200	3,200	3,200	12,800
Selling and general expenses	2,750	2,600	1,000	2,150	8,500
Income from operations	450	600	2,200	1,050	4,300

Again, all subjects in the four experimental conditions see the same expected quarterly *internal* information. The external reports expected in the quarterly and semiannual reporting conditions are presented in Figure 2, Panels A and B. The shading indicates the

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FIGURE 2
Experiment Two: Pro Forma External Reports Expected to Result from Each Investment Alternative

Panel A: Quarterly Reporting Condition

Presented below are ***two sets of pro forma financial statements*** indicating the expected amounts to be reported to shareholders if the company chooses each of the two alternatives. ***Please examine and compare them carefully. Then make your choice considering these statements and the facts presented on the prior page.***

Alternative One					
		Statement of Earnings (in $000)			
		Quarter 1	Quarter 2	Quarter 3	Quarter 4
Net sales		$6,000	$6,000	$6,000	$6,000
Less: Cost of goods sold		2,800	2,800	2,800	2,800
Gross profit		3,200	3,200	3,200	3,200
Selling and general expenses		2,200	2,200	2,200	2,200
Income from operations		1,000	1,000	1,000	1,000
Alternative Two					
		Statement of Earnings (in $000)			
		Quarter 1	Quarter 2	Quarter 3	Quarter 4
Net sales		$6,000	$6,000	$6,000	$6,000
Less: Cost of goods sold		2,800	2,800	2,800	2,800
Gross profit		3,200	3,200	3,200	3,200
Selling and general expenses		2,750	2,600	1,000	2,150
Income from operations		450	600	2,200	1,050

The fourth quarter is shaded here, but not in the instrument, to illustrate the period that would not be disclosed at the time of the stock issuance.

(*continued on next page*)

FIGURE 2 (continued)

Panel B: Semiannual Reporting Condition

Presented below are ***two sets of pro forma financial statements*** indicating the expected amounts to be reported to shareholders if the company chooses each of the two alternatives. ***Please examine and compare them carefully. Then make your choice considering these statements and the facts presented on the prior page.***

Alternative One			
Statement of Earnings (in $000)			
		1st Half	2nd Half
Net sales		$12,000	$12,000
Less: Cost of goods sold		5,600	5,600
Gross profit		6,400	6,400
Selling and general expenses		4,400	4,400
Income from operations		2,000	2,000
Alternative Two			
Statement of Earnings (in $000)			
		1st Half	2nd Half
Net sales		$12,000	$12,000
Less: Cost of goods sold		5,600	5,600
Gross profit		6,400	6,400
Selling and general expenses		5,350	3,150
Income from operations		1,050	3,250

The second half is shaded here, but not in the instrument, to illustrate the period that would not be disclosed at the time of the stock issuance.

period that will not be visible to the stock market at the time of the stock issuance. The unshaded portions of Figure 2 illustrate that the superiority of Alternative Two is *visible* to the stock market at the time of the stock issuance (the fourth quarter) *in the quarterly setting*, but not in the semiannual setting. All other aspects of the experiment are the same as in Experiment One.

Participants

Our participants in Experiment Two are 45 experienced financial managers (mean business experience = 23.5 years; mean accounting/financial experience = 21.5 years) from 17 publicly traded companies followed by financial analysts (median assets = $931 million).[22] The companies include a bank, a hotel chain, three retailers, three restaurant chains, two pharmaceutical companies, two information technology companies, one mining and processing company, and four manufacturers. Job titles range from CEO or CFO (seven) to Assistant Controller (two). Forty-nine percent of the participants are CPAs, four percent are CFAs, and nine percent CMAs. On average, 26.7 percent of their wealth is tied up in company stock. Again, anonymity for the individuals and firms is guaranteed and the experimental sessions take place during a training program.

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[22] Four of the companies overlap those in Experiment One.

Results

All participants answered the two manipulation check questions correctly. Mean preference scores, standard deviations, and participant choices by treatment combination are presented in Table 2, Panel A (and the means are graphed in Figure 3, Panel B). The overall analysis of variance is presented in Table 2, Panel B, while the simple main effects tests are presented in Panel C. The two main effects as well as the interaction are highly significant.

As noted above, the conflict between near-term reported earnings and total cash flow exists in the semiannual setting in Experiment Two. Thus, H1 can be tested by comparing the managers' weighted preferences between those facing the need to issue stock in the fourth quarter and those without that additional capital market incentive in the semiannual

TABLE 2
Results of Experiment Two

The data come from an experiment where 44 experienced financial managers select between two alternative investment projects and indicate their strength of preference. A negative preference score indicates a preference for the higher short-run earnings, lower total cash flows alternative (the myopic choice). A positive preference score indicates a preference for the lower short-run earnings, higher total cash flows alternative. The "Interim Reporting" treatment manipulates whether semiannual or quarterly reports are issued to investors. The "Stock Issuance" treatment manipulates whether a stock issuance is anticipated in the fourth quarter.

Panel A: Mean Managers' Preferences across Conditions (Standard Deviations in Parentheses) [# Choosing the Myopic Alternative/Sample Size in Brackets]

	Interim Reporting	
Stock Issuance	**Semiannual**	**Quarterly**
No Stock Issuance	13.0 (0) [0/11]	12.6 (0.8) [0/11]
Stock Issuance	−10.2 (6.8) [11/12]	11.9 (1.6) [0/11]

Panel B: Two-Way ANOVA (Effect of Interim Reporting and Stock Issuance)

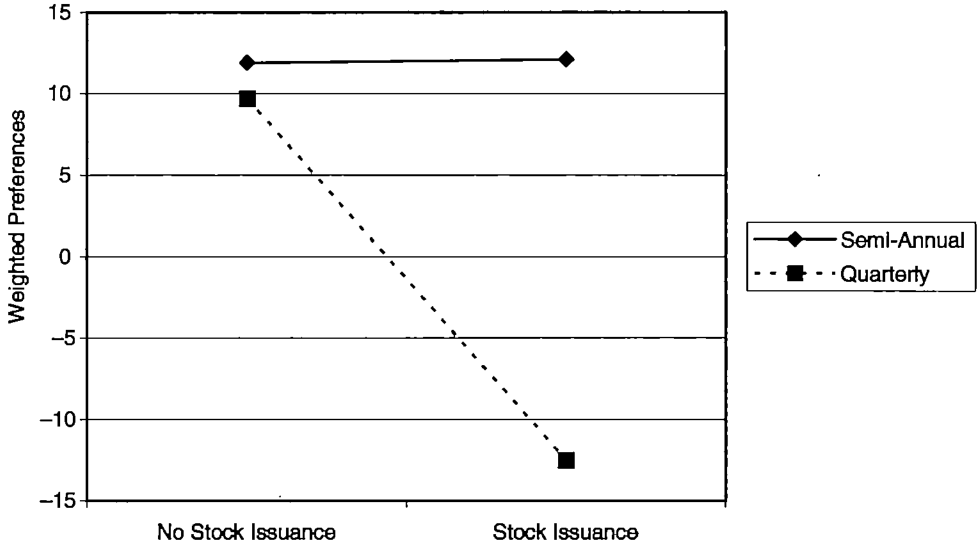
Source	df	Mean Squares	F-statistic	p-value
Interim Reporting	1	1324.0	100.3	.000
Stock Issuance	1	1603.4	121.5	.000
Interim Reporting × Stock Issuance	1	1414.2	107.2	.000
Error	41	13.2		

Panel C: Simple Main Effects Tests

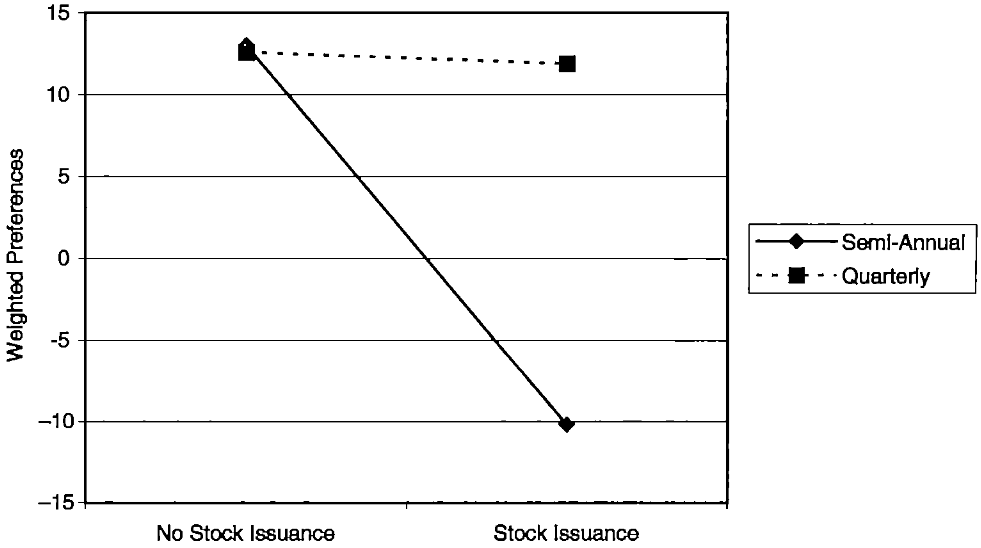
Simple Main Effects	df	F-statistic	p-value
Stock Issuance at Quarterly	1	0.2	.641
Stock Issuance at Semiannual	1	233.4	.000
Interim Reporting at No Stock Issuance	1	0.1	.816
Interim Reporting at Stock Issuance	1	211.9	.000

FIGURE 3
Results of Experiment One and Experiment Two

Panel A: Results of Experiment One



Panel B: Results of Experiment Two



setting. The difference in weighted preferences is highly significant (F = 233.4, p = .000). When there is no pending stock issuance, 11 of 11 participants select Alternative Two, which has lower year to date earnings, but higher total cash flows. However, consistent with Stein (1989), in response to the addition of a pending stock issuance in the fourth quarter, 11 of 12 participants select Alternative One (the myopic choice), which has higher year-to-date earnings, but lower total cash flows. This difference is highly significant (Fisher test, $p < .005$).

Since there is greater conflict between near-term earnings and total cash flows after two quarters than three in Experiment Two, H2 predicts that the stock issuance will cause a greater increase in myopic behavior in the semiannual setting than the quarterly setting. As predicted, the difference in weighted preferences caused by the addition of the stock issuance is significantly larger in the semiannual setting than in the quarterly setting ($F = 107.2$, $p = .000$).[23] In the quarterly setting where there is no conflict between near-term earnings and total cash flows, all 11 participants in the no stock issuance condition and in the stock issuance condition choose Alternative Two. As noted above, in the semiannual setting where there is a conflict between near-term earnings and total cash flows, all 11 participants choose Alternative Two in the no stock issuance condition, whereas in the stock issuance condition 11 of 12 participants choose Alternative One, the myopic alternative. This finding strongly supports the hypothesis.[24]

VI. CONCLUSION

In this study, we examine whether managers exhibit more myopic behavior in response to increased capital market pressure, controlling for agency frictions. We also examine the effect of change in disclosure frequency on myopic behavior. Using two experiments, we manipulate the degree of market pressure faced by the manager, frequency of reporting, and whether the increase in reporting frequency increases or decreases the conflict between near-term earnings and total cash flows, while controlling the internal information available to the manager and agency frictions. Our experienced financial managers' responses suggest that increases in stock market pressure can increase managerial myopia, even when managers are acting in the interests of existing shareholders. This behavior could occur due to perceived inability or unwillingness to credibly communicate information about future cash flows (of the high-cash-flow project). Our results also suggest that, in the presence of strong specific capital market pressure, increasing frequency of reporting from semiannual to quarterly can either increase or decrease myopic behavior. The effect depends on whether more frequent disclosure causes greater or lesser conflict between near-term earnings and total cash flows of the project choices. Because of the natural smoothing resulting from longer reporting periods, we expect that, on average, more frequent disclosure will cause greater myopia in the presence of significant stock market pressure.[25] Had we manipulated agency frictions in our setting, this could produce similar myopic behavior, which would be to the detriment of existing shareholders, rather than the new shareholders, as is the case in our study.

This study also suggests that not only do managers use accounting choices and estimates to meet short-term disclosure goals, as evidenced by studies of earnings management, but they are also willing to sacrifice cash flows in order to do so. This speaks to the value of providing managers with some accounting discretion. One potential implication of our results is that the absence of accounting discretion could cause managers to sacrifice cash flows in order to meet short-term goals, thereby diminishing the future prospects of the firm. However, this conjecture requires more evidence through further research.

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[23] An analysis of variance using the choices as the dichotomous dependent variable produces the same results.

[24] Since subjects are not assigned randomly between the two experiments, a three-way ANOVA, including experiment as well as capital market incentives and reporting frequency as factors, is not formally correct. For completeness, as expected, the three-way interaction in such an analysis is highly significant ($F = 181.8$, $p = .000$).

[25] As noted above, we do not speak to other factors that must be considered in the debate on disclosure frequency such as cost of disclosure, reliability of the information disclosed, excessive managerial time commitment to the disclosure process, etc.

Our study uses experienced financial managers to evaluate the relation between stock market pressure, disclosure frequency-induced earnings/cash flow conflict, and myopia. While this is a key strength of our paper, it also leaves open the possibility that other participants might respond differently to our treatments. Further, our study is limited to a setting of semiannual versus quarterly disclosure environments. Possibly managers would behave differently in a different disclosure environment (e.g., five yearly versus yearly). Finally, our study is limited by the 7.5 percent difference in cash flows between project choices that we present to the managers. Our results indicate that managers are not willing to sacrifice 7.5 percent of cash flows in the absence of additional capital market incentives provided by the stock issuance to achieve disclosure gains. Our results might have been different had the cash flow sacrifice been smaller (e.g., 1 percent). Similarly, our finding of myopia in the presence of additional capital market incentives might have been different had the cash flow sacrifice been larger (e.g., 25 percent). However, these limitations do not diminish our fundamental finding that myopic behavior can be affected by capital market incentives and disclosure frequency-induced earnings/cash flow conflict.

APPENDIX

Excerpts from articles on disclosure frequency and managerial myopia:

1. "Both Goldman Sachs and Deutsche Bank executives at the World Economic Forum in Davos on Monday argued that quarterly reporting not only encourages short-termism by investors and corporate management ..." (*Investor Relations Magazine*, January 30, 2003)
2. "Some of Europe's most powerful investors are calling on the European Commission to drop plans to introduce mandatory quarterly reporting for companies ... it (quarterly reporting) has not helped prevent corporate scandals in the U.S., and there is risk that it will encourage short-termism." (*Financial Times*, January 27, 2003)
3. "Hong Kong says no to quarterly reporting ... Critics say an unintended consequence will be short-termism in the market with investors focused on seasonal profits rather than long-term earnings growth." (*Investor Relations Magazine*, November 15, 2002)
4. "Short-termism ... The council does not believe that quarterly reporting will necessarily lead to or sharpen, short-term perspectives by companies ... nor does it accept the view that more frequent reporting will necessarily persuade companies to defer measures that would benefit their stakeholders in the long run." (Council on Corporate Disclosure and Governance, Singapore Exchange Limited, October 14, 2002)
5. "The Tokyo stock exchange has confirmed plans to require quarterly reporting by listed companies starting in two years." (*Investor Relations Magazine*, July 1, 2002)

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 21–53

928979

Assessing Alternative Proxies for the Expected Risk Premium

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ABSTRACT: Managers, investors, and researchers have a compelling interest in identifying a reliable empirical proxy for firm-specific cost of equity capital (*r*). In theory, deducing *r* is possible *if* the market's future cash flow forecast and current stock price are observable. Practically, deducing *r* is dependent on the ability to estimate the market's forecasted terminal value. We evaluate five methods of deducing firm-specific *r* (labeled $r_{DIVPREM}$, $r_{GLSPREM}$, $r_{GORPREM}$, $r_{OJNPREM}$, and $r_{PEGPREM}$) that deal with this conundrum differently. The extent to which the estimates are associated with firm risk in a stable and meaningful manner is the basis for our assessment. We find that the $r_{DIVPREM}$ and $r_{PEGPREM}$ estimates are consistently and predictably related to risk, while the alternatives are not. Based on these results, we conclude that $r_{DIVPREM}$ and $r_{PEGPREM}$ dominate the alternatives.

Keywords: *cost of equity capital; risk premium.*

Data Availability: *All data are obtained from publicly available sources.*

I. INTRODUCTION

Managers require a precise estimate of their firm's cost of equity capital for capital budgeting. Investors require the same for equity valuation, and academic researchers need reliable estimates of cost of equity capital when examining the effect of parameters of interest to the producers, consumers, and regulators of accounting information on firms' cost of raising equity funds. Thus, a broad range of individuals have compelling interests in identifying the best possible empirical proxy for a firm's "true" cost of equity capital. Although cost of equity capital plays these important roles, no well-accepted approach for estimating it exists. Cost of equity capital is generally conceived to be the discount rate the market applies to a firm's expected future cash flows to arrive at current stock price, but, as such, it is not directly observable. Provided current stock price is

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The authors thank Professor Nicolas Bollen for his assistance with the numerical approximation program. We also thank our anonymous reviewer, Neil Bhattacharya, Andrew Christie, Peter Easton, Myron Gordon, Mike Lemmon, Jim Ohlson, Ray Pfeiffer, David Plumlee, Taylor Randall, Jim Wahlen, and workshop participants at the University of Arkansas, the University of Colorado, Georgetown University, Louisiana State University, the University of Minnesota, the University of Notre Dame, New York University, The Ohio State University, the University of Oregon, Texas A&M University, The University of Texas at Austin, the Tenth Annual Accounting Finance Conference at the University of Michigan, Washington University, and the College of William & Mary, for their helpful comments and suggestions pertaining to previous versions of this paper.

Editor's note: This paper was accepted by Patricia Dechow, Editor.

Submitted June 2003
Accepted April 2004

observable, deducing a firm's cost of equity capital is possible *if* one can observe the market's forecasts of future cash flows; these data are also not directly discernable.

In theory the dividend discount formula equates current stock price to an infinite series of risk-adjusted expected future cash flows discounted at the risk-free rate. In practice the adjustment for risk is made to the discount rate and the infinite series of future cash flows is truncated by a terminal value. Thus, the short-horizon form of the classic dividend discount model equates current stock price to a finite series of expected future cash flows and a terminal value, discounted to the present at the cost of equity capital. Since the majority of the expected future cash flows reside in the terminal value, successful deduction of cost of equity capital depends largely on the ability to discern the market's terminal value forecast. Alternative approaches for estimating cost of equity capital deal with this terminal value conundrum in different ways.[1] We examine the relative reliability of five methods of generating cost of equity capital estimates based on equating current price with discounted future cash flows, which we refer to as: (1) $r_{DIVPREM}$, (2) $r_{GLSPREM}$, (3) $r_{GORPREM}$, (4) $r_{OJNPREM}$, and (5) $r_{PEGPREM}$.

$r_{DIVPREM}$, employed in Botosan and Plumlee (2002), imposes the assumption that analysts' and the market's forecasts of terminal value are consistent. $r_{GLSPREM}$, employed in Gebhardt et al. (2001), imposes the assumption that a firm's return-on-equity (ROE) reverts to the industry-level ROE beyond the forecast horizon. $r_{GORPREM}$, employed in Gordon and Gordon (1997), imposes the assumption that a firm's ROE reverts to its cost of equity capital beyond the forecast horizon. $r_{OJNPREM}$, derived in Ohlson and Juettner-Nauroth (2003) and operationalized in Gode and Mohanram (2003), imposes the assumption that a firm's abnormal earnings growth reverts to an economy-wide level beyond the forecast horizon. Finally, $r_{PEGPREM}$, also derived by Ohlson and Juettner-Nauroth (2003) but operationalized by Easton (2004), imposes the assumption of zero growth in abnormal earnings beyond the forecast horizon.

To provide a sense of which estimates capture the same underlying construct, we compare the average magnitude of the estimates and examine the correlations among them. We focus on the risk premium, defined as the cost of equity capital less the risk-free rate of interest, the metric most often employed in empirical research. We find that the average estimated risk premium varies from a low of 1 percent ($r_{GLSPREM}$) to a high of 6.6 percent ($r_{OJNPREM}$). While some have charged that a risk premium in excess of 6 percent is too high, we find that the average realized premium ($r_{REALPREM}$) during our sample period is even larger at 12.5 percent.

The correlations among the estimates range from a low of 0.30 (between $r_{PEGPREM}$ and $r_{GLSPREM}$) to a high of 0.86 (between $r_{PEGPREM}$ and $r_{OJNPREM}$), but for four of the five proxies (excluding $r_{GLSPREM}$) the pair-wise correlations are consistently greater than 0.60. Thus, to some extent, the estimates reflect variation in a common underlying construct, although each set of estimates also reflects variation unique to it. Finally, only $r_{PEGPREM}$ demonstrates any consistent positive correlation with one-year ahead average $r_{REALPREM}$, but at 0.07 even this correlation is weak. This result suggests that $r_{REALPREM}$ and the risk premium estimates do not capture the same underlying construct.

The five methods we examine differ primarily with respect to their terminal value assumptions. In each case, if the imposed assumption is descriptive of the market's expectation, the resulting estimates should approximate unobservable "true" cost of equity capital. We assess the relative reliability of the estimates by examining the association between the estimates and firm-specific risk. Estimates that capture cross-sectional variation in "true" cost of equity capital will be associated with firm-specific risk in a consistent and predictable manner. We include five proxies for firm-risk for which we have theoretically supported directional predictions—market risk, leverage, information risk, firm size, and growth. We find that the association among the $r_{DIVPREM}$ and $r_{PEGPREM}$ estimates and the firm-risk measures accord with theory and are stable across alternative specifications. In contrast, the associations among $r_{GLSPREM}$, $r_{GORPREM}$, and $r_{OJNPREM}$ and certain risk measures are unstable and contrary to theory, as is the association between $r_{REALPREM}$ and market risk.

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[1] See for example Botosan (1997), Gordon and Gordon (1997), Richardson and Welker (2001), Botosan and Plumlee (2002), Botosan et al. (2004), Barone (2002), Francis et al. (2003), and Khurana and Raman (2003).

Our research is motivated by the critical role a reliable estimate of cost of equity capital could play in research dedicated to answering many questions of significance to the accounting community. For example, do higher-quality audits reduce the cost of equity capital? Does the loss of a firm's financial reporting reputation increase its cost of equity capital? Does a firm's corporate governance structure affect its cost of equity capital? Has some major regulatory change of interest impacted cost of equity capital? Questions such as these are not adequately addressed by examining price responses, as it is difficult to disentangle the impact of a change in cost of equity capital from changes in forecasted cash flows through an examination of price changes.[2] Using changes in the firm's cost of equity capital a researcher can isolate the cost of equity capital effect, provided the cost of equity capital estimates employed are an adequate proxy for the underlying construct. Accordingly, both empiricists and those interested in interpreting the results of empirical research involving cost of equity capital estimates can benefit from the analysis undertaken in this study.

Baginski and Wahlen (2003) (BW) and Easton and Monahan (2003) (EM) are related to this study. Baginski and Wahlen estimate the price of risk and examine the association between their estimates and risk; our study differs from theirs in several respects. First, their price of risk metric differs from ours. Our metric is the expected cost of equity capital (r), whereas BW's is the difference between current stock price and stock price estimated by discounting future cash flows at the risk free rate of interest (PDIFF). Second, Baginski and Wahlen focus on one estimate of PDIFF, whereas we compare five alternative approaches for estimating r. The PDIFF estimate BW focus on is derived under the terminal value assumption that beyond the forecast horizon abnormal earnings grow at a constant rate in perpetuity. The measure we examine that is most closely related to PDIFF is $r_{OJNPREM}$, since $r_{OJNPREM}$ employs a similar terminal value assumption. Third, the purposes of the studies are different. BW is an interesting study of the incremental role of accounting-related measures of risk in explaining cross-sectional variation in PDIFF.[3] In contrast, our analysis provides guidance to individuals requiring firm-specific estimates of cost of equity capital.

EM employ the Vuolteenaho (2002) linear return decomposition approach and regress realized returns on proxies for cash flow and expected return news and various expected return estimates (including r_{PEG}, r_{OJN}, r_{GLS} and related variants of these estimates). In contrast to our approach, EM employ a minimum measurement error variance criteria to assess the validity of the estimates. Based on this criteria EM conclude that r_{PEG} is the worst performer while estimates drawn from a price-forward earnings model are as reliable as more sophisticated proxies. However, EM find that this "preferred" metric is negatively related to beta and standard deviation of returns, which clearly calls into question the validity of this metric. Moreover, EM do not include r_{DIV} or r_{GOR} in their analysis. While the EM approach to evaluating expected cost of capital metrics has the potential to contribute to the debate on the quality of the various metrics, disregarding risk proxies with strong theoretical and empirical support in the overall assessment of the metrics may lead to erroneous conclusions.[4]

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[2] For example, suppose a firm admits to producing fraudulent financial information and its stock price declines. A price decline is consistent with an increase in cost of equity capital due to greater information risk, but it is also consistent with a downward revision in cash flow forecasts.

[3] Of the two accounting-related measures of risk examined by BW (abnormal ROE beta and total volatility in abnormal ROE), abnormal ROE beta is a candidate for inclusion in our analysis since it captures systematic risk and so has theoretical support. However, BW document weak results with respect to this risk measure. Accordingly, we do not include an accounting-related measure of risk in our analysis.

II. EMPIRICAL APPROACH TO ASSESSING ALTERNATIVE PROXIES FOR THE EXPECTED RISK PREMIUM

Magnitude versus Cross-Sectional Distribution

A perfect estimation method for the cost of equity capital would yield risk premium estimates (r_{PREM}) identical in magnitude to the "true" risk premiums of the sample firms. The average r_{PREM} estimate produced by this method would equal the average "true" risk premium and ranking the firms by their r_{PREM} estimates would yield a cross-firm ranking identical to that obtained when the firms are ordered by their "true" risk premiums. In reality the r_{PREM} estimates produced by a given method may capture the average magnitude, but fail to capture the cross-sectional distribution or vice versa. For example, if the "true" average cost of equity capital were observable, it would be possible to generate a sample of estimates containing zero error, on average, by assigning the "true" average cost of equity capital to all firms in the sample. However, the resulting data would be useless in understanding why cost of equity capital varies across firms. Alternatively, the r_{PREM} estimates produced by a method may capture cross-sectional variation in a meaningful manner, but not average magnitude. Hence, we distinguish between assessing the average magnitude of the estimates and assessing their cross-sectional distribution.

Assessing Magnitude

To determine whether the average magnitude of the r_{PREM} estimates is "correct" one must identify the appropriate benchmark, a matter of much dissent. The estimated historical risk premium is sensitive to the period examined and the risk-free rate estimate selected, but estimates range from 3 percent to 9 percent.[5] Three of the methods we examine generate an average estimate within this range, so we cannot distinguish among them based on the average magnitude of the estimates. For this reason, we are agnostic about which methods produce an average r_{PREM} estimate that approximates the average "true" risk premium.

Assessing Cross-Sectional Distribution

While it is difficult to provide evidence regarding the point accuracy of the average estimate, it is possible to provide evidence regarding the adequacy of the cross-sectional distribution of the estimates by examining the association between the estimates and firm-specific risk. If the r_{PREM} estimates approximate the cross-sectional distribution of the "true" risk premium, they will be associated with risk in a consistent and predictable manner. Since the purpose of much empirical research is to test a directional hypothesis, employing r_{PREM} estimates that approximate the cross-sectional distribution of the "true" r_{PREM} is sufficient for the estimates to be useful in empirical research. Accordingly, we examine the relationship between the estimates and proxies for risk including market beta, leverage, information risk, firm size, and growth.

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[4] Our study, the EM study, and others that assess the validity of alternative expected cost of capital estimates share a common limitation. They are all vulnerable to measurement error in the proxies included in the regression (e.g., the risk proxies in our study; the cash flow and expected return news proxies in the EM study). Consequently, the use of a number of different approaches to assess the validity of alternative estimates is warranted.

[5] Most estimates of the historical risk premium range from 7 percent to 9 percent, but Claus and Thomas (2001) (CT) conclude that since 1985 the equity risk premium averaged around 3 percent. CT use the residual income valuation model and assume constant growth in abnormal earnings beyond the forecast horizon to generate a point estimate of the expected risk premium. CT investigate why their estimate is low relative to historical estimates, but unlike the current study, CT do not assess the reliability of their estimates.

III. ALTERNATIVE METHODS OF ESTIMATING THE EXPECTED RISK PREMIUM

All of the models examined in this paper are derived from the dividend discount formula shown below.

$$P_0 = \sum_{t=1}^{\infty} (1 + r)^{-t} E_0(dps_t) \tag{1}$$

where:

P_0 = price at time $t = 0$;
r = estimated cost of equity capital;
$E_0(\cdot)$ = the expectations operator; and
dps_t = dividends per share.

In this section we discuss how each model is derived from Equation (1) and document the assumptions underlying each. To simplify our notation we omit the expectations operator. A summary of the models' assumptions and Value Line data requirements is provided in Table 1.

We convert the expected cost of equity capital estimates to estimates of the risk premium by deducting the risk-free rate of interest (r_f). The five-year Treasury Constant Maturity Rate as of the end of the month in which we estimate expected cost of equity capital serves as our r_f estimate. We collect these data from the U.S. Federal Reserve at http://www.federalreserve.gov.

Method 1: Target Price Method ($r_{DIVPREM}$)

The target price method, introduced in Botosan and Plumlee (2002), employs a short-horizon form of Equation (1), where the infinite series of future cash flows is truncated at the end of year 5 by inserting a forecasted terminal value. This yields Equation (2) below. The primary assumption underlying this method is that analysts' forecasts of dividends per share during the forecast horizon and stock price at the end of the forecast horizon capture the market's expectation of those values.

$$P_0 = \sum_{t=1}^{5} (1 + r_{DIV})^{-t}(dps_t) + (1 + r_{DIV})^{-5}(P_5) \tag{2}$$

where:

P_5 = price at time $t = 5$; and
r_{DIV} = estimated cost of equity capital.

All other variables are defined previously.

TABLE 1
Summary of Assumptions and Data Requirements[a]

	CS[b]	ME[c]	Short-Horizon	Terminal Value	Value Line Forecasts
$r_{DIVPREM}$	No	Yes	• During the forecast horizon, analysts' forecasts of dividends equal the market's expectation.	• Beyond the forecast horizon analysts' forecasts of stock price equal the market's expectation.	• Dividends per share; current year, one year ahead, and long range • Long-range minimum and maximum target price
$r_{GLSPREM}$	Yes	Yes	• During the forecast horizon with analyst forecasts, analysts' forecasts of earnings and book value equal the market's expectation. • During the forecast horizon without analyst forecasts, firm ROE fades linearly to industry ROE.	• Beyond the forecast horizon, firms earn their industry ROE in perpetuity. • Beyond the forecast horizon, firms have a 100% dividend payout ratio.	• Earnings per share; current year, one year ahead, and long range • Dividends per share; one year ahead and long range • Book value per share; current year, one-year ahead, and long range
$r_{GORPREM}$	Yes	Yes	• During the forecast horizon, analysts' forecasts of dividends equal the market's expectation.	• Beyond the forecast horizon, each firm's ROE equals its cost of equity capital.	• Dividends per share; current year, one-year ahead, and long range • Earnings per share; long range
$r_{OJNPREM}$	No	Yes	• Analysts' forecasts of earnings in years 1 and 2 and analysts' forecasts of dividends in year 1 equal the market's expectation. • Year 1 earnings and year 2 "abnormal earnings" defined as $r^{-1}(eps_2 + rdps_1 - R\ eps_1)$ are positive.	• Growth in "abnormal earnings" defined as $r^{-1}(eps_{t+1} + rdps_t - R\ eps_t)$ occurs at a constant rate for all t. • Estimated constant rate of growth in abnormal earnings equals the market's expectation. • Constant rate of growth is less than the cost of equity and greater than zero.	• Dividends per share; current year • Earnings per share; one year ahead and long range

(*continued on next page*)

TABLE 1 (continued)

$r_{PEGPREM}$	No	Yes	• Analysts' forecasts of earnings in years 1 and 2 equal the market's expectation. • Zero dividends in year 1. • Year 1 earnings and year 2 "abnormal earnings" defined as $r^{-1}(eps_2 - R\ eps_1)$ are positive.	• Beyond the forecast horizon zero growth in "abnormal earnings."	• Earnings per share; one-year ahead and long range

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[a] The assumptions above are stated in general terms and underlie the theoretical form of each model. For empirical purposes, additional assumptions are imposed regarding the length of the forecast horizon. These assumptions are noted in the text of the paper.

[b] CS = Clean Surplus.

[c] ME = Market Efficiency.

Dividend forecasts for the current fiscal year ($t = 1$), the following fiscal year ($t = 2$), and the long run ($t = 5$), as well as maximum and minimum long-run target price estimates are collected from forecasts published by Value Line during the third quarter of the calendar year. Since Value Line does not provide dividend forecasts for years $t = 3$ and $t = 4$, we interpolate between the year $t = 2$ and $t = 5$ dividend forecasts using an implied straight-line rate of growth in dividends from year $t = 2$ to year $t = 5$.

Our forecast of terminal value (P_5) is the 25th percentile of Value Line's forecasted long-run price range, although our conclusions are robust to the use of the 50th percentile or the minimum value. We use the 25th percentile to adjust for an apparent optimistic bias in analysts' forecasts of target price. Current stock price (P_0) equals the stock price reported on CRSP on the Value Line publication date or closest date thereafter within three days of publication. We use a numerical approximation program to identify the annual firm-specific r_{DIV} that equates the right- and left-hand sides of Equation (2) to within a \$0.005 difference between the actual and fitted-value of P_0.[6] $r_{DIVPREM}$ equals r_{DIV} less r_f.

Since r_{DIV} is not estimated at the beginning of the firm's fiscal year, we adjust our computations to reflect the impact of partial years between the measurement date of r_{DIV} and the future cash flows. Following prior research (e.g., Courteau et al. 2001; Francis et al. 2000), we discount Value Line's forecasts of the firm's *n*th year's dividends and target price by a factor of $(n-1+f)$, where f is the fraction of the year between the forecast date and the firm's fiscal year end. In addition, we adjust the current fiscal-year dividend forecast to remove an estimate of the portion of the "forecasted" dividend that was distributed to investors prior to the forecast date. For example, suppose that in August Value Line forecasts \$3.00 in dividends for a December year-end firm. Assuming the firm pays dividends quarterly, the dividend forecast includes \$1.50 in dividends paid prior to the forecast date. Accordingly, we exclude one-half of the current year forecasted dividends from our computations. Similar adjustments are made for all firms based on their fiscal year end and Value Line forecast date.

The target price estimates introduced in 2002 by Botosan and Plumlee are identical to the estimates generated by the Botosan (1997) method, *if* the clean surplus relation holds. Since clean surplus violations are observed, this tends not to be the case. Even so, the correlation between the estimates is generally quite high (typically in excess of 0.95), suggesting that clean surplus violations have a minimal effect on the resulting estimates. In addition, as noted in Francis et al. (2003), the cost of capital estimates described in Brav et al. (2003) are basically the same as the estimates derived in Botosan and Plumlee (2002) and, accordingly, Botosan (1997). The only tangible difference in the Brav et al. (2003) approach, is that they generate their short-horizon dividend forecasts by applying an assumed dividend yield to the year $t = 1$ dividend forecast. This trivial difference has little effect on the resulting estimates.

Method 2: Industry Method ($r_{GLSPREM}$)

The industry method, introduced by Gebhardt et al. (2001) (GLS), employs a residual income valuation model derived from Equation (1) and a 12-year forecast horizon. The resulting model is replicated in Equation (3).

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[6] We employ the numerical approximation program in estimating three of our five r_{PREM} estimates. The numerical approximation program requires a starting value for r. Our initial value is 10 percent, but in all cases the cost of equity capital estimates produced by the numerical approximation program are invariant to an initial starting value of $r = 20$ percent.

$$P_0 = b_0 + \sum_{t=1}^{11} (1 + r_{GLS})^{-t}((ROE_t - r_{GLS})b_{t-1}) + (r_{GLS}(1 + r_{GLS})^{11})^{-1}((ROE_{12} - r_{GLS})b_{11}) \quad (3)$$

where:

ROE_t = return on equity for period $t = \frac{eps_t}{b_{t-1}}$;
eps_t = forecasted earnings per share, year t;
b_t = book value per share, year t; and
r_{GLS} = estimated cost of equity capital.

All other variables are defined previously.

For the first three years, GLS assume that analysts' forecasts of eps_t and b_t equal the market's expectation. For the next nine years, GLS assume that firm *ROE* fades linearly to the industry median. Beyond the forecast horizon, GLS assume that the final term $((ROE_{12} - r_{GLS})b_{11})$ remains constant in perpetuity. Accordingly, GLS assume that firm *ROE* remains at the industry median beyond the forecast horizon, and, since b_t must be constant beyond year $t = 11$, GLS) assume a 100 percent dividend payout ratio beyond year $t = 11$.

Our estimation procedures are similar to those of GLS. We begin by grouping all stocks on the Compustat PST, Full Coverage and Research Tapes into the 48 industry classifications employed in Fama and French (1997). Industry median *ROE* is a ten-year moving median of past *ROE*s, excluding firms with negative b_ts but including firms with losses. We use three years of explicit Value Line forecasts of eps_t and b_t to compute forecasted *ROE*s for years $t = 1$ through $t = 3$. Beyond year $t = 3$ each firm's ROE fades linearly to its industry median *ROE* by year $t = 12$. Forecasted b_t for each year during this period is generated by adding the estimated eps_t implied by the *ROE* and subtracting estimated dps_t, from estimated b_{t-1}. The dividend payout ratio implied by year $t = 3$ forecasted dps_t and eps_t is used to estimate dps_t paid beyond year $t = 3$. Current stock price (P_0) is obtained in the manner described previously. Finally, b_0 is the book value per share at the quarter end closest to a date on or before June 30th of the Value Line publication year, collected from the quarterly Compustat tape.

We use a numerical approximation program to identify the annual firm-specific r_{GLS} that equates the right- and left-hand sides of Equation (3) within a \$0.005 difference between the actual and fitted-value of P_0. The timing adjustments described above for r_{DIV} are also made. $r_{GLSPREM}$ equals r_{GLS} less r_f.

Method 3: Finite Horizon Method ($r_{GORPREM}$)

The finite horizon specification of the Gordon Growth Model is taken from Gordon and Gordon (1997) (GG) and is akin to the method employed in Lee et al. (1999). GG derive their valuation model (replicated in Equation (4)) from Equation (1) by assuming each firm's *ROE* reverts to its cost of equity capital beyond the forecast horizon. The model also assumes that analysts' forecasts of short horizon dividends and long-run earnings per share capture the market's expectation.

$$P_0 = \sum_{t=1}^{4} (1 + r_{GOR})^{-t}(dps_t) + (r_{GOR}(1 + r_{GOR})^4)^{-1}(eps_5) \quad (4)$$

where:

r_{GOR} = estimated cost of equity capital.

All other variables are defined previously.

All data are obtained from the sources described previously. We use a numerical approximation program to identify the annual firm-specific r_{GOR} that equates the right- and left-hand sides of Equation (4) to within a \$0.005 difference between the actual and fitted-value of P_0. The timing and dividend adjustments described above for r_{DIV} are made when estimating r_{GOR}. $r_{GORPREM}$ equals r_{GOR} less r_f.

Method 4: Economy-Wide Growth Method ($r_{OJNPREM}$)

Ohlson Juettner-Nauroth (2003) (OJ) derive alternative accounting-based valuation models from Equation (1). They begin by noting that the following general algebraic equation holds for any sequence of numbers $\{y_t\}_{t=0}^{\infty}$ provided $(1 + r)^{-T}y^T \rightarrow 0$ as $T \rightarrow \infty$.

$$0 = y_0 + (1 + r)^{-1}(y_1 - (1 + r)y_0) + (1 + r)^{-2}(y_2 - (1 + r)y_1) + \dots \tag{5}$$

Adding Equations (1) and (5) yields Equation (6).

$$P_0 = y_0 + \sum_{t=1}^{\infty} (1 + r)^{-t}(y_t - (1 + r)y_{t-1}) + \sum_{t=1}^{\infty} (1 + r)^{-t}(dps_t). \tag{6}$$

OJ equate y_t in Equation (6) to $\frac{eps_{t+1}}{r}$ and perform some simple mathematical operations to derive Equation (7).

$$P_0 = \frac{eps_1}{r} + \sum_{t=1}^{\infty} (1 + r)^{-t} z_t \tag{7}$$

where:

$$z_t = r^{-1}(eps_{t+1} - (1 + r)eps_t + rdps_t).$$

OJ then impose a series of assumptions related to near-term earnings and abnormal earnings (see Equations (8) and (9)), the rate of short-term growth in abnormal earnings ($\hat{g}_2$) (see Equations (10) and (11)), and the rate of infinite growth in abnormal earnings beyond the forecast horizon ($\gamma - 1$) (see Equations (12) and (13)).

$$eps_1 > 0 \tag{8}$$

$$z_1 > 0 \tag{9}$$

$$\hat{g}_2 = g_2 - r \tag{10}$$

$$g_2 = \frac{eps_2 - eps_1}{eps_1} + \frac{rdps_1}{eps_1} \tag{11}$$

$$z_{t+1} = \gamma z_t \text{ for } t = 1, 2, \dots \tag{12}$$

$$1 \leq \gamma \leq (1 + r). \tag{13}$$

Imposing these assumptions on the valuation formula specified in Equation (7) yields the following valuation formula:

$$P_0 = \frac{eps_1}{r} + \frac{eps_1\left(\frac{eps_2 - eps_1}{eps_1} + \frac{rdps_1}{eps_1} - r\right)}{r((1 + r) - \gamma)}. \tag{14}$$

Finally, OJ solve Equation (14) to arrive at the formula (15a):

$$r_{OJN} = A + \sqrt{A^2 + \frac{eps_1}{P_0} * \left(\frac{eps_2 - eps_1}{eps_1} - (\gamma - 1)\right)} \tag{15a}$$

where:

$$A = \frac{1}{2}\left((\gamma - 1) + \frac{dps_1}{P_0}\right).$$

The empirical procedures we follow mirror Gode and Mohanram (2003) (GM). We substitute the average of forecasted near-term growth $\left(\text{computed as } \frac{eps_3 - eps_2}{eps_2}\right)$ and five-year growth $\left(\text{computed as } \frac{eps_5 - eps_4}{eps_4}\right)$ for short-term growth $\frac{eps_2 - eps_1}{eps_1}$. This allows the growth estimate to incorporate information implied by both near- and medium-term earnings forecasts. Accordingly, the empirical specification of the equation we employ to estimate r_{OJN} is given by Equation 15(b):

$$r_{OJN} = A + \sqrt{A^2 + \frac{eps_1}{P_0} * \left(\frac{\frac{eps_3 - eps_2}{eps_2} + \frac{eps_5 - eps_4}{eps_4}}{2} - (\gamma - 1)\right)}. \tag{15b}$$

OJ suggest that $\gamma - 1$ is well represented by economy-wide growth, and so, like GM, we assume γ. is equal to $1+(r_f - 3\%)$. Finally, in operationalizing this approach one must also assume that analysts' forecasts of eps_t and dps_t approximate the markets. We use Value Line forecasts of eps_t and dps_t, P_0 from CRSP and Equation (15b) to compute r_{OJN}. $r_{OJNPREM}$ is r_{OJN} less r_f.

Method 5: PEG Ratio Method ($r_{PEGPREM}$)

The equation for r_{PEG} is derived from Equation (15a) after imposing two *additional* assumptions: $dps_1 = 0$ and, $\gamma = 1$ (i.e., no growth in abnormal earnings beyond the forecast horizon). The resulting formula is given in Equation (16a):

$$r_{PEG} = \sqrt{\frac{eps_2 - eps_1}{P_0}}. \tag{16a}$$

Our empirical procedures mirror those of Easton (2004), except for the following. We use long-run earnings forecasts (eps_5 and eps_4) in place of eps_2 and eps_1. Our reasons for this are two-fold. First, when eps_2 is less than eps_1 we cannot solve the model, which limits our sample size. Since eps_5 always exceeds eps_4, this problem is avoided by using eps_5 and eps_4. Second, changes in abnormal earnings beyond the forecast horizon are more likely zero when long-run earnings forecasts are employed, resulting in fewer violations of a critical assumption of the model. Accordingly, the empirical specification of the equation we employ to estimate r_{PEG} is given by Equation 16(b):

$$r_{PEG} = \sqrt{\frac{eps_5 - eps_4}{P_0}}. \tag{16b}$$

To assess the sensitivity of our estimates to this alteration, we also estimated $r_{PEGPREM}$ using eps_2 less eps_1, consistent with the original model. The estimates are highly positively correlated (coefficient of 0.62). $r_{PEGPREM}$ is r_{PEG} less r_f.

A significant difference between $r_{OJNPREM}$ and $r_{PEGPREM}$ and the three earlier alternatives is that $r_{OJNPREM}$ and $r_{PEGPREM}$ are not deduced by numerical approximation, but are produced by formula. Since earnings growth figures prominently in the formulas, we anticipate growth will play a particularly significant role in explaining cross-sectional variation in both $r_{OJNPREM}$ and $r_{PEGPREM}$.

Average Realized Premium ($\bar{r}_{REALPREM}$)

Some prior research estimates the cost of equity capital using average realized returns under the assumption that, when averaged over large samples, realized returns are an unbiased estimate of the market's required return (i.e., the cost of equity capital). However, existing research demonstrates that realized returns may not be a reliable proxy for the cost of equity capital, even when averaged over large numbers of firms or long periods. For example, Elton (1999, 1199) notes that realized returns are on average less than the risk-free rate for some periods of ten years or more and he suggests this is evidence that "realized returns are a very poor measure of expected returns." Moreover, prior research linking average realized returns and risk has met with limited success. For example, Fama and French (1992) fail to provide convincing evidence of an association between average realized returns and market beta.

Recently, Guay et al. (2003) (GKS) attempt to assess the validity of r_{GLS}, r_{GOR}, r_{OJN}, and a related variant of these approaches by examining the correlation between the estimates and future realized returns. Generally GKS conclude that none of the estimates are highly correlated with future returns, but among those listed, r_{GLS} tends to be the most highly correlated. In order for the results of this study to be reliable, future realized returns must be a valid proxy for expected returns. But, as discussed below, the credibility of this assumption is tenuous. Consequently, it is not clear if the lack of correlation between the estimates and future realized returns heralds a problem with the estimates, future realized returns, or both. Even more troubling is the possibility that future realized returns capture something systematic other than expected returns. This may explain why r_{GLS} tends to be the most highly correlated with future realized returns, even though it tends not to be related to firm-specific risk characteristics in a stable or intuitive manner (see Gebhardt et al. (2001) and Gode and Mohanram (2003)).

Realized returns are problematic because the expected cost of equity capital (r) is a relatively stable component of the return, whereas the unexpected component (r_u) varies dramatically and continuously as new information is impounded in stock price. Variance in r_u so overwhelms variance in r that a very large sample with a stationary r is necessary to eliminate r_u through averaging. Consistent with this, Vuolteenaho (2002) concludes that information about future cash flows is the dominant factor in firm-level stock returns. Lakonishok (1993) concludes it would take 60 years of realized returns for all firms in the capital market to have sufficient statistical power to prove market beta is a priced risk factor. Clearly this engenders highly unpalatable assumptions regarding inter-temporal/cross-firm stability in r.

These problems are exacerbated in accounting studies, which are often characterized by small samples. Moreover, the samples employed may be nonrandom, selected because the observations share some common characteristic or event. Under such circumstances the degree of averaging possible may not be sufficient to eliminate r_u, leading to an increased risk of drawing inappropriate inferences arising from a relationship between the dependent variable and r. Even so, for purposes of discussion, we include one-year ahead average realized risk premiums ($\bar{r}_{REALPREM}$) in much of our analyses.

We compute buy-and-hold returns for each firm-year beginning with the month in which we estimate the r_{PREM} estimates described previously. We generate firm-year realized risk premiums ($r_{REALPREM}$) by deducting the annualized risk free rate of interest based on the last month of the firm-year. Finally, consistent with prior research, we average the $r_{REALPREM}$ estimates across size-based deciles to generate average realized risk premium estimates ($\bar{r}_{REALPREM}$). We re-assign firms to size-based deciles annually according to their market value of equity on December 31 of the year prior to the realized return estimation period.

IV. MODEL DEVELOPMENT AND EMPIRICAL RESEARCH DESIGN

Model Development

Ross's (1976) Arbitrage Pricing Theorem (APT) loosely motivates the regression equation we use to assess the relationship between the r_{PREM} estimates and firm-specific risk. Ross's APT implies the following equation for r_{PREM} (time subscripts are suppressed):

$$r_{PREM} = \sum_{k=1}^{K} \lambda_k(E(r_k) - r_f). \tag{17}$$

That is, a firm's r_{PREM} is a function of the excess expected returns associated with K risk factors. Ross's APT does not identify the risk factors, although theoretical research suggests several potential candidates. We include the following sources of risk in our analysis: market beta, leverage, information risk, firm size, and growth.

Regression Models

We estimate a series of three regression models that incorporate a systematically expanding set of risk factors. Since much of the variation in the cost of capital estimates derives from variation in the terminal value, assumptions placed on terminal value may systematically limit variation in the resulting estimates leading to induced spurious correlation. For example, if an industry-specific assumption is placed on terminal value (as in the GLS model), it is not surprising that industry is a particularly important factor in explaining variation in the resulting estimates (GLS). For this reason, it is particularly important to assess the robustness of the association between the cost of capital estimates and firm-specific risk to the inclusion of potential candidates for induced spurious correlation.

The first model we estimate includes market beta, leverage, information risk, and a measure of firm size based on the market value of equity:

$$r_{PREM_{it}} = \gamma_0 + \gamma_1 UBETA_{it} + \gamma_2 DM_{it} + \gamma_3 INFO_{it} + \gamma_4 LMKVL_{it} + \varepsilon_{it} \tag{18}$$

where:

r_{PREM} = estimated risk premium produced by one of the five methods;
$UBETA$ = unlevered CAPM beta;
DM = leverage;
$INFO$ = information risk; and
$LMKVL$ = the market value of equity.

While perspectives differ in the literature regarding the nature of the risk captured by book-to-price, some (e.g., Berk 1995) argue that book-to-price and market value of equity play similar roles in that both capture variation in unmeasured risk when included in an incomplete model of expected returns. We add book-to-price (*BP*) to the model in a separate step to assess the effect of including *BP* on the coefficients associated with the other risk factors. This yields our second model:

$$r_{PREM_{it}} = \gamma_0 + \gamma_1 UBETA_{it} + \gamma_2 DM_{it} + \gamma_3 INFO_{it} + \gamma_4 LMKVL_{it} + \gamma_5 BP_{it} + \varepsilon_{it}. \tag{19}$$

It is important to assess the impact of including growth in the model on the coefficients associated with the other explanatory variables because $r_{OJNPREM}$ and $r_{PEGPREM}$ are strongly related to growth by construction and highly significant correlations exist among growth and several of the other risk proxies. Expanding the set of explanatory variables to include earnings growth (*EXGRW*) yields our final model:

$$\begin{aligned} r_{PREM_{it}} = {} & \gamma_0 + \gamma_1 UBETA_{it} + \gamma_2 DM_{it} + \gamma_3 INFO_{it} + \gamma_4 LMKVL_{it} + \gamma_5 BP_{it} \\ & + \gamma_6 EXGRW_{it} + \varepsilon_{it}. \end{aligned} \tag{20}$$

Explanatory Variables

Unlevered Beta (UBETA)

When levered beta (*MBETA*) is included in the model the interpretation of the coefficient on *MBETA* is unclear because *MBETA* captures leverage risk as well as market risk (e.g., Hamada 1972; Chung 1989). To circumvent this problem we employ unlevered beta (*UBETA*) in our primary analysis. We discuss the results of estimating our regression equations with *MBETA* instead of *UBETA* in a subsequent section of the paper.

We expect the coefficient on *UBETA* (i.e., γ_1) to be positive because the CAPM indicates that cost of equity capital is increasing in *UBETA* (Lintner 1965; Mossin 1966; Sharpe 1964). The procedures we follow to unlever *BETA* are described in standard finance textbooks (e.g., Kester et al. 1997). Briefly:

$$BETA_i = UBETA_i + \frac{Debt_i}{Equity_i} UBETA_i. \tag{21}$$

Solving Equation (21) for *UBETA* yields the formula:

$$UBETA_i = \frac{BETA_i}{1 + \frac{Debt_i}{Equity_i}}. \tag{22}$$

We use CRSP data to estimate *MBETA* via the market model with a minimum of 30 out of 60 monthly returns and a market index return equal to the value-weighted NYSE/AMEX return. Since our r_{PREM} estimates employ forecast data collected during the third calendar quarter, we end the beta estimation period in June of the year r_{PREM} is estimated. We compute debt-to-equity by dividing long-term debt by stockholders' equity. Both variables are measured at the end of the fiscal year prior to the time we estimate r_{PREM} and are collected from the Compustat tape.

Leverage (DM)

Modigliani and Miller (1958) suggest that as the amount of debt in the firm's capital structure increases, risk increases. This relation may be obscured if *MBETA* is included in the model, but estimating the model with *UBETA* allows us to unequivocally predict a positive coefficient on *DM* (γ_2). *DM* is the ratio of long-term debt to the market value of common equity. Debt is measured as described above. Market value of common equity is measured on December 31 prior to the year we estimate r_{PREM} and is collected from the CRSP tape or Compustat tape, if unavailable on CRSP.

Information Risk (INFO)

Theory suggests that greater information is associated with a lower cost of equity capital through reduced transaction costs and/or reduced estimation risk.[7] Our proxy for information risk (*INFO*) is the width of the range between Value Line's minimum and maximum price forecasts scaled by the midpoint of range. Since the width of the range reflects the analyst's uncertainty with respect to his/her price forecast, and we argue analyst uncertainty is an increasing function of information risk, we expect the coefficient on *INFO* (γ_3) to be positive. We recognize, however, that the width of the price range is likely a function of "risk" more broadly defined, such that our *INFO* variable captures more than just information risk. Even so, we unambiguously predict a positive coefficient on *INFO*, since we expect the width of the range to be increasing in risk. The interpretation of the coefficient on *INFO*, in terms of the source of risk captured, may be open to debate, however.

Market Value of Equity (LMKVL)

Berk (1995) argues that, unless the model for expected returns includes all risk factors, a negative association between the market value of equity and expected returns will be observed because market value and risk are inherently inversely related. Accordingly, we expect the coefficient on the market value of equity (*LMKVL*) (γ_4) to be negative. *LMKVL* is the natural log of the market value of common equity at December 31 of the year prior to the year r_{PREM} is estimated. Data are obtained from CRSP or, if unavailable, from Compustat. We log transform the data to mitigate the effect of skewness in the data.

Book-to-Price (BP)

Berk (1995) also argues that book-to-price and cost of equity capital should be positively associated because book-to-price is inversely related to the market value of equity and consequently is positively related to risk in general. In contrast, Dechow et al. (2004) (DSS) argue that book-to-price is a crude proxy for "equity duration" and that high book-to-price stocks are low duration, less risky stocks.

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[7] See, for example, Demsetz (1968), Copeland and Galai (1983), Glosten and Milgrom (1985), Amihud and Mendelson (1986), Diamond and Verrecchia (1991), Klein and Bawa (1976), Barry and Brown (1985), Coles and Loewenstein (1988), Handa and Linn (1993), Coles et al. (1995), and Clarkson et. al. (1996).

Consistent with DSS, we find that book-to-price is negatively associated with market beta. However, consistent with Berk (1995), we find that book-to-price is negatively associated with the market value of equity. Moreover, we find that book-to-price is positively associated with risk as measured by debt-to-market and the width of the price range. These findings are consistent with Berk's (1995) claim that high book-to-market stocks are more risky. Finally, in large sample studies, prior research consistently documents a positive association between book-to-price and cost of equity capital as proxied by average realized returns (Chan et al. 1991; Fama and French 1992; Davis 1994; Davis et al. 2000). Thus, we conclude that the weight of the existing evidence supports a prediction of a positive coefficient on *BP* (γ_5).

The numerator of *BP* is the book value per share at the quarter end closest to a date on or before June 30th of the Value Line publication year. These data are collected from the quarterly Compustat tape. Price per share, the denominator, is collected from the CRSP tape and is the stock price on the Value Line publication date or closest date thereafter within three days of publication.

Expected Growth in Earnings (EXGRW)

Beaver et al. (1970) argue that abnormal profits arising from growth opportunities erode as competition enters the marketplace. Consequently, abnormal earnings derived from growth opportunities are riskier than "normal" earnings, thereby generating a positive association between growth and risk. La Porta (1996) provides empirical evidence of such an association. He finds high expected-growth stocks have higher standard deviations of returns and higher market betas than low expected-growth stocks and concludes that high-growth firms are riskier than low-growth firms. Hence, we expect the coefficient on earnings growth (γ_6) to be positive. We estimate future expected earnings growth (*EXGRW*) using the growth in forecasted earnings five years hence. We compute *EXGRW* for each firm-year by taking the difference between Value Line's forecasts of eps_5 and eps_4 and scaling by the eps_4 forecast. It is not necessary to use the absolute value of eps_4 in the denominator because all of our eps_4 forecasts are positive.

V. SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

Sample Selection

Our sample is comprised of 12,400 firm-year observations drawn from 1983–1993. For each firm-year, we require: (1) Value Line forecasts, (2) current stock price, (3) sufficient data to compute our explanatory variables, and (4) positive forecast of earnings in year $t = 2$. Our sample size varies across years, from a low of 1,013 firms in 1986 to a high of 1,226 firms in 1991. The years in our sample period are limited based on available Value Line data in a machine readable form. The OJ model assumes near-term expected earnings are positive and r_{PEG} requires increasing earnings (see summary of assumptions provided in Table 1). Thus, employing r_{OJN} or r_{PEG} in empirical research requires assumptions that may systematically bias the sample toward more stable, less risky firms. In some settings, these limitations may have implications for statistical power.

Descriptive Statistics for Estimates of r_{PREM}

Table 2, Panel A provides descriptive statistics pertaining to our five r_{PREM} estimates and the realized return premium ($r_{REALPREM}$). The statistics included in this table are based

TABLE 2
Descriptive Statistics about the Various Specifications of Expected Risk Premium and Risk Proxies[a]

Panel A: Descriptive Statistics of Expected Risk Premium Estimates

	$r_{DIVPREM}$	$r_{GLSPREM}$	$r_{GORPREM}$	$r_{OJNPREM}$	$r_{PEGPREM}$	$r_{REALPREM}$
Mean	6.4%	1.0%	2.1%	6.6%	5.0%	12.5%
Percentiles						
1%	−6.6	−6.5	−4.8	−1.1	−3.5	−64.6
25%	1.9	−0.7	0.2	4.1	1.8	−15.6
50%	5.7	1.0	2.0	6.1	4.4	5.0
75%	10.0	2.7	3.8	8.6	7.3	30.0
99%	28.4	8.5	11.0	18.2	20.0	183.0
Standard Deviation	6.9	3.7	3.2	3.9	4.8	47.5

Panel B: Descriptive Statistics for Risk Proxies

	MBETA	*UBETA*	*DM*	*INFO*	*MKVL*	*BP*	*EXGRW*
Mean	1.10	0.77	0.53	0.39	1610.9	0.68	14.8
Percentiles:							
1%	0.23	0.08	0.00	0.15	22.5	0.09	2.9
25%	0.81	0.49	0.08	0.33	156.6	0.41	10.0
50%	1.09	0.74	0.28	0.40	448.9	0.62	13.5
75%	1.37	1.00	0.65	0.45	1330.3	0.86	17.8
99%	2.31	1.97	3.95	0.67	19235.4	2.00	40.2
Standard Deviation	0.44	0.42	1.05	0.11	4496.8	0.41	7.4

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[a] The sample contains 12,400 firm/year observations from 1983–1993.

Variable Definitions:

$r_{DIVPREM}$ = the estimated risk premium based on the target price method (Botosan and Plumlee 2002) less the risk-free rate;
$r_{GLSPREM}$ = estimated risk premium based on the industry method (Gebhardt et al. 2001) less the risk-free rate;
$r_{GORPREM}$ = estimated risk premium based on the finite horizon growth method (Gordon and Gordon 1997) less the risk-free rate:
$r_{OJNPREM}$ = estimated risk premium based on the Ohlson and Juettner-Nauroth (2003) economy-wide method less the risk-free rate;
$r_{PEGPREM}$ = estimated risk premium based on the PEG formula (Easton 2004) less the risk-free rate;
$r_{REALPREM}$ = the buy-and-hold realized return computed over the 12 months beginning with the month in which we estimate cost of equity capital, less the risk-free rate;
MBETA = estimated via the market model with a minimum of 30 monthly returns over the 60 months prior to June of the year expected cost of equity capital (*r*) is estimated using a value-weighted NYSE/AMEX market index return;
UBETA = *MBETA* divided by 1 plus the debt-to-equity ratio. The debt-to-equity ratio is long-term liabilities divided by stockholders' equity at the end of the fiscal year;
DM = long-term liabilities at the end of the fiscal year prior to the date *r* is estimated, scaled by the market value of equity on December 31st of the year prior to the date *r* is estimated;
INFO = the *VL* price high less *VL* price low, scaled by the midpoint of *VL* price high and *VL* price low;
LMKVL = the natural log of the market value of equity on December 31st of the year prior to the date *r* is estimated, stated in millions of dollars;
BP = the book value of equity at the end of the most recent quarter prior to the date *r* is estimated, scaled by the market value of equity on December 31st of the year prior to the date *r* is estimated; and
EXGRW = earnings growth computed by dividing the difference in forecasted earnings five periods in the future less forecasted earnings four periods in the future by the absolute value of forecasted earnings four periods in the future.

on data pooled across years. The r_{PREM} estimates range from a mean of 1 percent for $r_{GLSPREM}$ to a mean of 6.6 percent for $r_{OJNPREM}$. Average $r_{DIVPREM}$, $r_{OJNPREM}$, and $r_{PEGPREM}$ are similar in magnitude, ranging from 5 to 6.6 percent, while mean and median $r_{GLSPREM}$ and $r_{GORPREM}$ are much lower at approximately 1 and 2.1 percent, respectively. At 12.5 percent, mean $r_{REALPREM}$ exceeds that of all five r_{PREM} estimates. However, the mean is skewed by extreme observations; median $r_{REALPREM}$ (5 percent) is in line with the median values of $r_{DIVPREM}$, $r_{OJNPREM}$, and $r_{PEGPREM}$.

Figure 1 graphs the annual mean r_{PREM} estimates produced by each method. $r_{DIVPREM}$ is clearly the most variable, which is confirmed by the standard deviation statistics presented in Table 2. This should not be surprising. $r_{DIVPREM}$'s underlying assumptions do not constrain variation in the estimates to the same extent as the assumptions underlying the other r_{PREM} estimates. In addition, mean $r_{OJNPREM}$ and $r_{PEGPREM}$ are highly correlated; correlation statistics presented in Table 3 confirm this observation. Such a relationship is expected since the formula for $r_{PEGPREM}$ is a special case of the formula for $r_{OJNPREM}$. Finally, excluding $r_{DIVPREM}$, a clear rank ordering exists among the estimates with $r_{OJNPREM}$ establishing the ceiling and $r_{GLSPREM}$ marking the floor.

Descriptive Statistics for Independent Variables

Table 2, Panel B provides descriptive statistics for our explanatory variables. *MBETA* is included because it is more amenable to interpretation than *UBETA*. Mean *MBETA* is 1.10 indicating that our sample firms are relatively risky. The average firm is highly leveraged with mean *DM* of 0.53, but the median *DM* is much lower (0.28). The mean width of the target price range (i.e., *INFO*) is approximately 40 percent of the midpoint of the

FIGURE 1
Mean Expected Risk Premium by Year

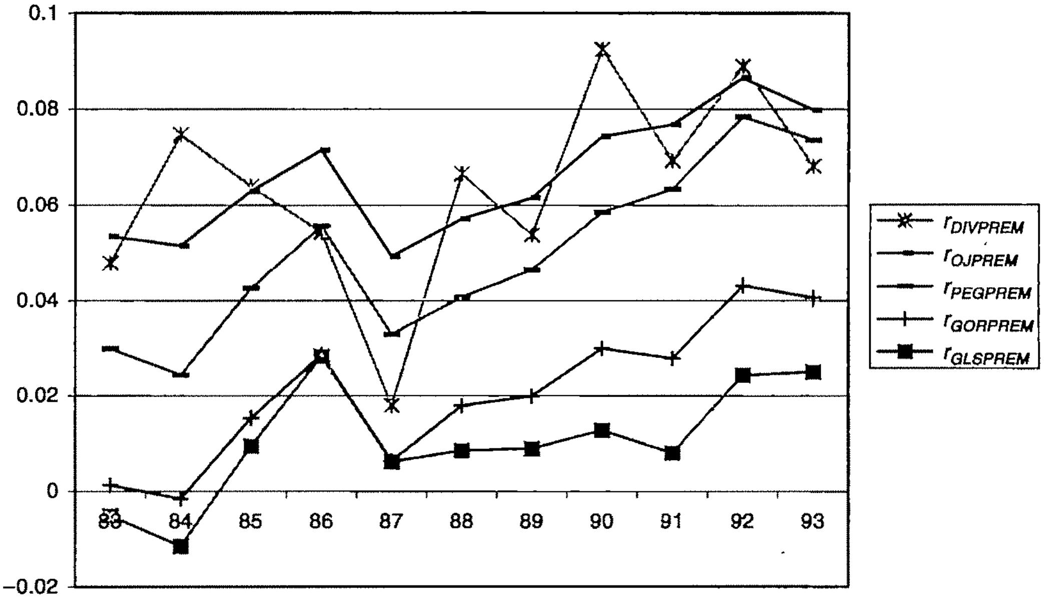

TABLE 3
Mean of Year-by-Year Spearman Correlation Coefficients between Various Specifications of Expected Risk Premium, Risk Proxies, and Expected Risk Premium Estimates and Risk Proxies

Panel A: Correlations among Expected Risk Premium Estimates

	$r_{DIVPREM}$	$r_{GLSPREM}$	$r_{GORPREM}$	$r_{OJNPREM}$	$r_{PEGPREM}$	$\bar{r}_{REALPREM}$
$r_{DIVPREM}$	—	0.33 (11/0)	0.61 (11/0)	0.61 (11/0)	0.60 (11/0)	0.00 (2/2)
$r_{GLSPREM}$		—	0.71 (11/0)	0.36 (11/0)	0.30 (11/0)	0.01 (2/0)
$r_{GORPREM}$			—	0.68 (11/0)	0.60 (11/0)	0.03 (3/0)
$r_{OJNPREM}$				—	0.86 (11/0)	0.03 (3/0)
$r_{PEGPREM}$					—	0.07 (7/0)

Panel B: Correlations among Risk Proxies

	MBETA	*UBETA*	*DM*	*INFO*	*LMKVL*	*BP*	*EXGRW*
MBETA	—	0.74 (11/0)	−0.12 (0/9)	0.37 (11/0)	−0.11 (0/8)	−0.12 (0/8)	0.34 (11/0)
UBETA		—	−0.64 (0/11)	0.14 (9/0)	−0.05 (0/3)	−0.18 (0/11)	0.23 (11/0)
DM			—	0.19 (11/0)	−0.12 (0/10)	0.47 (11/0)	−0.02 (1/1)
INFO				—	−0.38 (0/11)	0.10 (9/1)	0.34 (11/0)
LMKVL					—	−0.24 (0/11)	−0.28 (0/11)
BP						—	0.10 (3/2)

Panel C: Correlations among Expected Risk Premium Estimates and Risk Proxies

	MBETA	*UBETA*	*DM*	*INFO*	*LMKVL*	*BP*	*EXGRW*
$r_{DIVPREM}$	0.194 (10/1)	0.09 (9/1)	0.09 (7/0)	0.19 (10/1)	−0.15 (1/8)	0.24 (11/0)	0.38 (11/0)
$r_{GLSPREM}$	−0.074 (2/6)	−0.17 (0/9)	0.34 (11/0)	0.02 (3/2)	−0.05 (1/7)	0.61 (11/0)	−0.09 (1/9)
$r_{GORPREM}$	−0.002 (4/4)	−0.16 (1/9)	0.40 (11/0)	0.13 (8/1)	−0.16 (1/9)	0.60 (11/0)	0.13 (7/1)
$r_{OJNPREM}$	0.085 (8/2)	−0.05 (1/5)	0.26 (11/0)	0.20 (10/0)	−0.21 (0/10)	0.42 (11/0)	0.68 (11/0)
$r_{PEGPREM}$	0.321 (11/0)	0.14 (11/0)	0.16 (10/0)	0.36 (10/0)	−0.32 (0/11)	0.32 (11/0)	0.82 (11/0)
$\bar{r}_{REALPREM}$	0.02 (2/0)	−0.00 (0/0)	0.04 (4/0)	0.10 (9/0)	−0.18 (0/11)	0.06 (7/0)	0.06 (6/0)

(*continued on next page*)

TABLE 3 (continued)

Table values are the mean of year-by-year correlations. Numbers in parentheses are the number of times the correlation is significantly (positive/negative) in year-by-year correlations. The sample contains 12,400 firm/year observations from 1983–1993.

Variable definitions:

$r_{DIVPREM}$ = the estimated risk premium based on the target price method (Botosan and Plumlee 2002) less the risk-free rate;
$r_{GLSPREM}$ = estimated risk premium based on the industry method (Gebhardt et al. 2001) less the risk-free rate;
$r_{GORPREM}$ = estimated risk premium based on the finite horizon growth method (Gordon and Gorton 1997) less the risk-free rate;
$r_{OJNPREM}$ = estimated risk premium based on the Ohlson and Juettner-Nauroth (2003) economy-wide method less the risk-free rate;
$r_{PEGPREM}$ = estimated risk premium based on the PEG formula (Easton 2004) less the risk-free rate;
$\bar{r}_{REALPREM}$ = the buy-and-hold realized return averaged over firm-size portfolios and computed over the 12 months beginning July of the year for which we estimate cost of equity capital, less the risk-free rate;
MBETA = estimated via the market model with a minimum of 30 monthly returns over the 60 months prior to June of the year expected cost of equity capital (r) is estimated using a value-weighted NYSE/AMEX market index return;
UBETA = *MBETA* divided by 1 plus the debt-to-equity ratio. The debt-to-equity ratio is long-term liabilities divided by stockholders' equity at the end of the fiscal year;
DM = long-term liabilities at the end of the fiscal year prior to the date r is estimated, scaled by the market value of equity on December 31st of the year prior to the date r is estimated;
INFO = the *VL* price high less *VL* price low, scaled by the midpoint of *VL* price high and *VL* price low;
LMKVL = the natural log of the market value of equity on December 31st of the year prior to the date r is estimated, stated in millions of dollars;
BP = the book value of equity at the end of the most recent quarter prior to the date r is estimated, scaled by the market value of equity on December 31st of the year prior to the date r is estimated; and
EXGRW = earnings growth computed by dividing the difference in forecasted earnings five periods in the future less forecasted earnings four periods in the future by the absolute value of forecasted earnings four periods in the future.

range suggesting a fair degree of analyst uncertainty about future stock price. The firm size data are skewed with mean *MKVL* of $1610.9 million compared to a median value of $448.9 million. Mean *BP* of 0.68 indicates that our sample firms tend to trade at market values in excess of book values. Mean long-range growth in expected earnings (*EXGRW*) is 14.8 percent. This statistic is similar to the 15.1 percent mean long-term growth in I/B/E/S earnings documented by Gode and Mohanram (2003). Thus, Value Line growth forecasts appear similar to those of I/B/E/S analysts.

VI. EMPIRICAL RESULTS

Table 3 presents correlation statistics. To mitigate the impact of outlying observations we present Spearman correlation coefficients. The $r_{REALPREM}$ estimates included in this and subsequent tables are based on realized premiums averaged over firms assigned to size-based portfolios (denoted $\bar{r}_{REALPREM}$). The values reported are averages of year-by-year correlation coefficients across the 11 sample years; the number of years the correlation coefficients are significantly positive/negative is shown in parentheses.

Correlation among Estimates of r_{PREM}

Panel A of Table 3 presents correlation statistics among the r_{PREM} estimates. The average correlation of 0.86 between $r_{PEGPREM}$ and $r_{OJNPREM}$ is largest, which reflects the fact that $r_{PEGPREM}$ is a special case of $r_{OJNPREM}$. The average correlation coefficients between

$r_{GLSPREM}$ and $r_{DIVPREM}$, $r_{OJNPREM}$, and $r_{PEGPREM}$ are 0.33, 0.36 and 0.30, respectively, approximately half as large as the remaining correlation coefficients. This suggests that the variation captured by r_{GLS} differs from the variation captured by these estimates. Regardless, the year-by-year correlation coefficients among all of the r_{PREM} estimates are significant in all 11 years. Thus, a strong and persistent relationship exists among the various estimates, suggesting that they capture cross-sectional variation in the same underlying construct to at least some degree.

Except for $r_{PEGPREM}$, the correlation between $\bar{r}_{REALPREM}$ and the r_{PREM} estimates is not significantly positive in a majority of years. The largest average correlation is between $\bar{r}_{REALPREM}$ and the $r_{PEGPREM}$, but even it is small at 0.07. This suggests that $\bar{r}_{REALPREM}$ and the r_{PREM} estimates do not capture the same underlying construct. For reasons discussed extensively above, we do not find this result surprising. The need for alternative estimates would be mitigated if $\bar{r}_{REALPREM}$ was an adequate proxy for expected cost of equity capital.

Correlation among Risk Proxies

Panel B of Table 3 presents the average of the year-by-year correlation coefficients among our risk proxies. We include *MBETA* for discussion purposes. *MBETA* is highly positively correlated with *UBETA* (coefficient of 0.74) and negatively correlated with *DM*. These correlations are consistently positive/negative in a majority of our sample years. *UBETA* and *DM* are negatively correlated (average −0.64), which is not surprising since as debt-to-equity rises *UBETA* falls (see Equation (22)), all else equal.

The correlation coefficients between *EXGRW* and *UBETA, INFO,* and *LMKVL* are statistically significant in all 11 years. High-growth firms tend to have higher market betas (coefficient of 0.23), analysts tend to be more uncertain regarding their future stock price estimates (coefficient of 0.34), and they tend to be smaller (coefficient of −0.28). *BP* and *DM* are positively correlated (coefficient of 0.47), perhaps reflecting that both measures use price in the denominator. Finally, *INFO* is negatively correlated with *LMKVL* (coefficient of −0.38), consistent with larger firms having richer information environments and less information risk.

Correlations between Estimates of r_{PREM} and Explanatory Variables

Panel C of Table 3 presents the average of the year-by-year correlation coefficients among our r_{PREM} estimates, $\bar{r}_{REALPREM}$, and explanatory variables, with *MBETA* included for discussion purposes. $r_{DIVPREM}$ and $r_{PEGPREM}$ are positively related to *UBETA* (*MBETA*) in nine (ten) years and all 11 years, respectively. In contrast, and opposite to the predicted theoretical relationship, $r_{GLSPREM}$ and $r_{GORPREM}$ are negatively related to *UBETA* in nine years, whereas the relationship with $r_{OJNPREM}$ is negative in five years and positive in only one year. Even so, the association between $r_{GLSPREM}$, $r_{GORPREM}$, and $r_{OJNPREM}$ and *MBETA* is positive in two, four, and eight years, respectively. This highlights a difficulty with *MBETA,* however. Since *MBETA* captures leverage risk and these r_{PREM} estimates are strongly positively associated with *DM,* it is unclear from these results whether the relationship between *MBETA* and the estimates is a function of market risk or leverage. The associations between *DM* and $r_{DIVPREM}$ and $r_{PEGPREM}$ are more modest, but still positive in seven and ten years, respectively. These results indicate that more highly levered firms are riskier. Finally, $\bar{r}_{REALPREM}$ is not significantly related to *UBETA* in any year and is positively related to *MBETA* in only two years. These results echo the weak results documented in prior research that examines the association between average realized returns and market beta.

The average correlation between *INFO* and each of the r_{PREM} estimates and $\bar{r}_{REALPREM}$ is positive, consistent with investors demanding compensation for information risk, but the strength of the association varies widely. The coefficients range from 0.02 ($r_{GLSPREM}$) to 0.36 ($r_{PEGPREM}$). The association between $r_{GLSPREM}$ and *INFO* is significantly positive in only three years, whereas the association with the remaining r_{PREM} estimates and with $\bar{r}_{REALPREM}$ is positive in eight or more years.

The average correlation between *LMKVL* and each of the r_{PREM} estimates and $\bar{r}_{REALPREM}$ is negative in the majority of years, supporting Berk's (1995) claim that firm size and risk are inversely related. The coefficients range from -0.05 ($r_{GLSPREM}$) to -0.32 ($r_{PEGPREM}$). Also consistent with Berk (1995), the average correlation between *BP* and each of the r_{PREM} estimates and $\bar{r}_{REALPREM}$ is positive in the majority of years. Of particular note are the strong correlations between *BP* and $r_{GORPREM}$ and $r_{GLSPREM}$ (approximately 0.60).

Except for $r_{GLSPREM}$, the average correlation between *EXGRW* and each of the r_{PREM} estimates and $\bar{r}_{REALPREM}$ is positive in the majority of years. The correlation between *EXGRW* and $r_{OJNPREM}$ and $r_{PEGPREM}$ is particularly strong, with correlation coefficients of 0.68 and 0.82, respectively. This serves as a stark reminder of the algebraic relationship between these estimates and growth, and underscores the importance of examining the robustness of our regression results to the inclusion of growth. Surprisingly, but consistent with certain findings in Gebhardt et al. (2001), the average correlation between $r_{GLSPREM}$ and *EXGRW* is *negative*. This result is stable over time, as the correlation coefficient is significantly negative in nine years. In summary, only $r_{PEGPREM}$ and $r_{DIVPREM}$ consistently demonstrate the expected univariate correlations with the risk measures.

Regression of r_{PREM} Estimates on *UBETA, DM, INFO,* and *LMKVL*

Table 4, Panel A presents the results of estimating regression Equation (18).[8] The results document inconsistencies with theory in the association between $r_{GLSPREM}$, $r_{GORPREM}$, $r_{OJNPREM}$, and $\bar{r}_{REALPREM}$ and the risk proxies. $r_{GORPREM}$ and $r_{OJNPREM}$ are unrelated to *UBETA*, while $r_{GLSPREM}$ and $\bar{r}_{REALPREM}$ are *negatively* related to *UBETA*. A negative coefficient on *UBETA* is particularly troubling as it implies that firms characterized by less market risk bear a higher cost of equity capital. In addition, $r_{GLSPREM}$ is not related to *INFO* or *LMKVL*. Together, these results confirm the relatively weak performance of these estimates documented in Table 3. In contrast, $r_{DIVPREM}$ and $r_{PEGPREM}$ behave as if the cross-sectional distribution of the estimates approximates the cross-sectional distribution of the "true" risk premium. Both estimates are related to market risk, leverage risk, information risk, and the residual risk captured by firm size in the manner predicted by theory.

Regression of r_{PREM} Estimates on *UBETA, DM, INFO, LMKVL,* and *BP*

Table 4, Panel B presents the results of estimating regression Equation (19), which adds *BP* to the set of explanatory variables. Certain associations between $r_{GLSPREM}$, $r_{GORPREM}$, $r_{OJNPREM}$, and $\bar{r}_{REALPREM}$ and the risk proxies continue to run counter to theory. In the case of $r_{GLSPREM}$ and $r_{GORPREM}$ some of the coefficients lose, while others gain, statistical significance suggesting that the association between these r_{PREM} estimates and risk is sensitive to the set of risk variables included in the analysis. $r_{GLSPREM}$ continues to be negatively related to *UBETA* and unrelated to *INFO*, but the coefficient on *LMKVL* flips sign, becoming significantly positive, opposite in sign to that predicted by theory. Although the association between $r_{GORPREM}$ and *UBETA* is insignificant in Panel A, the coefficient on *UBETA* in Panel B of Table 4 is negative and more than two standard deviations from zero. Moreover, *LMKVL* is no longer statistically significant in the $r_{GORPREM}$ regression, however if *BP* dominates market value of equity as a proxy for residual risk, this result is expected. The associations between $r_{OJNPREM}$ and $\bar{r}_{REALPREM}$ and the risk proxies are robust to the addition of *BP* to the model, including the atheoretical associations between these estimates and *UBETA*. Finally, the addition of *BP* to the model estimated with $r_{PEGPREM}$ and $r_{DIVPREM}$ yields results consistent with expectations. The results of estimating the model with $r_{PEGPREM}$ are invariant to this change and the coefficient on *BP* is positive, consistent with theory. The only variable to lose statistical significance in the $r_{DIVPREM}$ model is *LMKVL*, which is expected if *BP* dominates *LMKVL* as a proxy for residual risk.

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[8] The regression coefficient values we report throughout the paper are the average parameter estimates from year-by-year regressions with Fama-MacBeth t-statistics shown in parentheses.

BP plays a pivotal role in explaining the cross-sectional variation in some of the r_{PREM} estimates. The addition of *BP* to the regression equation estimated with $r_{GLSPREM}$ almost triples the R^2 of the model from 6.9 percent (Panel A) to 20.5 percent (Panel B). Similarly, the R^2 of the model estimated with $r_{GORPREM}$ doubles from 15.8 percent (Panel A) to 33.4 percent (Panel B).

TABLE 4
Regressions of Various Specifications of Expected Risk Premium on Selected Risk Proxies[a]

Panel A: $r_{PREM_{it}} = \gamma_0 + \gamma_1 UBETA_{it} + \gamma_2 DM_{it} + \gamma_3 INFO_{it} + \gamma_4 LMKVL_{it} + \varepsilon_{it}$

	Intercept (?)	*UBETA* (+)	*DM* (+)	*INFO* (+)	*LMKVL* (−)	Avg. Adj. R^2
$r_{DIVPREM}$	0.058 (3.44)**	0.020 (4.51)**	0.010 (6.71)**	0.084 (5.54)**	−0.004 (−2.47)**	9.4 %
$r_{GLSPREM}$	0.023 (2.86)**	−0.007 (−2.97)##	0.008 (7.56)**	−0.004 (−0.86)	−0.001 (−1.49)	6.9 %
$r_{GORPREM}$	0.034 (5.73)**	−0.003 (−1.75)	0.010 (7.76)**	0.017 (1.98)*	−0.002 (−4.30)**	15.8 %
$r_{OJNPREM}$	0.086 (13.79)**	0.001 (0.56)	0.009 (9.06)**	0.042 (5.96)**	−0.003 (−8.08)**	12.1 %
$r_{PEGPREM}$	0.069 (7.74)**	0.017 (10.85)**	0.012 (10.50)**	0.093 (13.10)**	−0.006 (−12.11)**	22.7 %
$\bar{r}_{REALPREM}$	0.48 (16.80)**	−0.008 (−4.15)##	0.003 (3.79)**	0.025 (2.74)**	−0.017 (−8.28)**	9.4 %

Panel B: $r_{PREM_{it}} = \gamma_0 + \gamma_1 UBETA_{it} + \gamma_2 DM_{it} + \gamma_3 INFO + \gamma_4 LMKVL_{it} + \gamma_5 BP_{it} + \varepsilon_{it}$

	Intercept (?)	*UBETA* (+)	*DM* (+)	*INFO* (+)	*LMKVL* (−)	*BP* (+)	Avg. Adj. R^2
$r_{DIVPREM}$	0.010 (0.79)	0.019 (5.19)**	0.005 (4.29)**	0.086 (5.81)**	−0.001 (−1.32)	0.035 (7.88)**	13.5 %
$r_{GLSPREM}$	−0.016 (−1.75)	−0.007 (−2.41)##	0.003 (2.57)**	−0.001 (−0.36)	0.001 (1.92)#	0.031 (6.81)**	20.5 %
$r_{GORPREM}$	−0.008 (−1.20)	−0.003 (−3.21)##	0.005 (5.39)**	0.019 (2.57)**	−0.000 (−0.12)	0.032 (13.72)**	33.4 %
$r_{OJNPREM}$	0.043 (5.14)**	0.000 (0.17)	0.004 (5.17)**	0.044 (7.08)**	−0.001 (−3.13)**	0.032 (14.93)**	22.7 %
$r_{PEGPREM}$	0.028 (2.60)*	0.016 (11.21)**	0.007 (7.89)**	0.095 (14.37)**	−0.004 (−7.57)**	0.030 (12.49)**	29.1 %
$\bar{r}_{REALPREM}$	0.470 (16.34)**	−0.008 (−4.54)##	0.002 (2.25)*	0.026 (2.78)**	−0.017 (−8.00)**	0.005 (1.45)	9.5 %

(*continued on next page*)

TABLE 4 (continued)

**, * Indicates significant at < 1%, 5% level (one-tailed, respectively).

##, # Indicates more than two (one) standard deviations from 0, respectively.

[a] Table values are mean parameter estimates from 11 year-by-year regressions. Fama-MacBeth t-statistics in parentheses. Average number of observations employed in estimation of year-by-year regressions is 1,129. The sample contains 12,400 firm/year observations from 1983–1993.

Variable definitions:

$r_{DIVPREM}$ = the estimated risk premium based on the dividend discount method (Botosan and Plumlee 2002) formula less the risk-free rate;

$r_{GLSPREM}$ = estimated risk premium based on the industry method (Gebhardt et al. 2001) less the risk-free rate;

$r_{GORPREM}$ = estimated risk premium based on the finite horizon growth method (Gordon and Gordon 1997) less the risk-free rate;

$r_{OJNPREM}$ = estimated risk premium based on the Ohlson and Juettner-Nauroth (2003) economy-wide method less the risk-free rate;

$r_{PEGPREM}$ = estimated risk premium based on the PEG formula (Easton 2004) less the risk-free rate;

$\bar{r}_{REALPREM}$ = the buy-and-hold realized return averaged over firm-size portfolios and computed over the 12 months beginning July of the year for which we estimate cost of equity capital, less the risk-free rate;

UBETA = capital market beta divided by (1 + the debt-to-equity ratio). Capital market beta is estimated via the market model with a minimum of 30 monthly returns over the 60 months prior to June of the year expected cost of equity capital (r) is estimated using a value-weighted NYSE/AMEX market index return. The debt-to-equity ratio is long-term liabilities divided by stockholders' equity at the end of the fiscal year;

DM = long-term liabilities at the end of the fiscal year prior to the date r is estimated, scaled by the market value of equity on December 31st of the year prior to the date r is estimated;

INFO = the *VL* price high less *VL* price low, scaled by the midpoint of *VL* price high and *VL* price low;

LMKVL = the natural log of the market value of equity on December 31st of the year prior to the date r is estimated, stated in millions of dollars; and

BP = the book value of equity at the end of the most recent quarter prior to the date r is estimated, scaled by the market value of equity on December 31st of the year prior to the date r is estimated.

Regression of r_{PREM} Estimates on *UBETA, DM, INFO, LMKVL, BP,* and *EXGRW*

Table 5 presents the results of estimating regression Equation (20), which adds *EXGRW* to the mix. These results provide additional support for the conclusion that $r_{GLSPREM}$, $r_{GORPREM}$, $r_{OJNPREM}$, and $\bar{r}_{REALPREM}$ do not vary with risk in a predictable manner. The associations between $r_{GORPREM}$ and $\bar{r}_{REALPREM}$ and the risk measures are virtually unaffected by the addition of *EXGRW* to the model. Notably, however, the coefficient on *UBETA* continues to be negative in both models.

The two models most affected by the addition of *EXGRW* to the set of explanatory variables are the models estimated with $r_{GLSPREM}$ and $r_{OJNPREM}$. Consider first the model estimated with $r_{GLSPREM}$. While the coefficient on *UBETA* continues to be negative, the coefficient on *INFO,* insignificant in the previous tables, becomes positive and the coefficient on firm size, previously positive, loses statistical significance. Finally, the coefficient on *EXGRW* is negative, opposite to the predicted association. This finding is unique to the $r_{GLSPREM}$ model but consistent with our univariate analysis and findings documented in Gode and Mohanram (2003). Clearly the association between $r_{GLSPREM}$ and various proxies for risk is highly model-dependent. This model dependence is consistent with results documented by Gebhardt et al. (2001). For example, they find that the association between $r_{GLSPREM}$ and market beta is positive, negative or insignificant, depending on the set of risk variables included in the model.

The results of the model estimated with $r_{OJNPREM}$ are even more dramatically affected by the addition of *EXGRW* to the model. First, the explanatory power of the model increases

TABLE 5
Regressions of Various Specifications of Expected Risk Premium on All Risk Proxies[a]

$$r_{PREM_{it}} = \gamma_0 + \gamma_1 UBETA_{it} + \gamma_2 DM_{it} + \gamma_3 INFO_{it} + \gamma_4 LMKVL_{it} + \gamma_5 BP_{it} + \gamma_6 EXGRW_{it} + \varepsilon_{it}$$

	Intercept (?)	*UBETA* (+)	*DM* (+)	*INFO* (+)	*LMKVL* (−)	*BP* (+)	*EXGRW* (+)	Avg. Adj. R^2
$r_{DIVPREM}$	−0.027	0.012	0.004	0.041	0.000	0.030	0.267	21.1 %
	(−2.62)*	(3.03)**	(2.95)**	(3.83)**	(0.32)	(7.23)**	(8.89)**	
$r_{GLSPREM}$	−0.009	−0.005	0.003	0.006	0.000	0.032	−0.046	21.5 %
	(−1.02)	(−1.93)#	(2.77)**	(1.85)*	(0.98)	(6.96)**	(−6.11)##	
$r_{GORPREM}$	−0.013	−0.004	0.005	0.013	0.000	0.031	0.036	34.8 %
	(−1.83)*	(−4.14)##	(5.03)**	(1.93)*	(0.53)	(13.39)**	(3.27)**	
$r_{OJNPREM}$	−0.004	−0.009	0.003	−0.011	0.001	0.027	0.327	58.2 %
	(−0.56)	(−9.72)##	(3.94)**	(−1.69)	(2.72)#	(13.22)**	(19.54)**	
$r_{PEGPREM}$	−0.035	0.004	0.005	0.021	−0.001	0.023	0.440	73.8 %
	(−3.96)**	(4.44)**	(7.56)**	(3.61)**	(−2.23)*	(10.01)**	(31.28)**	
$\bar{r}_{REALPREM}$	0.465	−0.009	0.002	0.021	−0.016	0.005	0.029	9.6 %
	(16.79)**	(−4.25)##	(2.10)*	(2.20)*	(−8.09)**	(1.33)	(2.59)**	

(continued on next page)

TABLE 5 (continued)

**, * Indicates significant at $< 1\%$, 5% level (one-tailed, respectively).

Indicates more than two standard deviations from 0, respectively.

[a] Table values are mean parameter estimates from 11 year-by-year regressions. Fama-MacBeth t-statistics in parentheses. Average number of observations employed in estimation of year-by-year regressions is 1,127. The sample contains 12,400 firm/year observations from 1983–1993.

Variable definitions:

$r_{DIVPREM}$ = the estimated risk premium based on the target price method (Botosan and Plumlee 2002) less the risk-free rate;
$r_{GLSPREM}$ = estimated risk premium based on the industry method (Gebhardt et al. 2001) less the risk-free rate;
$r_{GORPREM}$ = estimated risk premium based on the finite horizon growth method (Gordon and Gordon 1997) less the risk-free rate;
$r_{OJNPREM}$ = estimated risk premium based on the Ohlson and Juettner-Nauroth (2003) economy-wide method less the risk-free rate;
$r_{PEGPREM}$ = estimated risk premium based on the PEG formula (Easton 2004) less the risk-free rate;
$\bar{r}_{REALPREM}$ = the buy-and-hold realized return averaged over firm-size portfolios and computed over the 12 months beginning July of the year for which we estimate cost of equity capital, less the risk-free rate;
UBETA = capital market beta divided by (1 + the debt-to-equity ratio). Capital market beta is estimated via the market model with a minimum of 30 monthly returns over the 60 months prior to June of the year expected cost of equity capital (r) is estimated using a value-weighted NYSE/AMEX market index return. The debt-to-equity ratio is long-term liabilities divided by stockholders' equity at the end of the fiscal year;
DM = long-term liabilities at the end of the fiscal year prior to the date r is estimated, scaled by the market value of equity on December 31st of the year prior to the date r is estimated;
INFO = the *VL* price high less *VL* price low, scaled by the midpoint of *VL* price high and *VL* price low;
LMKVL = the natural log of the market value of equity on December 31st of the year prior to the date r is estimated, stated in millions of dollars;
BP = the book value of equity at the end of the most recent quarter prior to the date r is estimated, scaled by the market value of equity on December 31st of the year prior to the date r is estimated; and
EXGRW = earnings growth computed by dividing the difference in forecasted earnings five periods in the future less forecasted earnings four periods in the future by the absolute value of forecasted earnings four periods in the future.

over 250 percent, from 22.7 percent in Table 4, Panel B to 58.2 percent in Table 5. Coincident with the surge in explanatory power, the coefficients on *UBETA* and *LMKVL* reverse sign and the coefficient on *INFO* loses statistical significance. Taken at face value, these results imply that expected cost of equity capital is lower for small firms with greater market risk and unrelated to information risk.

The explanatory power of the model estimated with $r_{PEGPREM}$ also increases more than 250 percent from 29.1 percent in Table 4, Panel B to 73.8 percent in Table 5 with the addition of *EXGRW*. Unlike the model estimated with $r_{OJNPREM}$, the sign of the coefficients are stable and consistent with theory. Even so, the magnitude and statistical significance of the coefficients on *UBETA*, *INFO*, and *LMKVL* are dramatically reduced. Specifically, the coefficient on *UBETA* declines from 0.016 (t-statistic = 11.21) to 0.004 (t-statistic = 4.44); the coefficient on *INFO* declines from 0.095 (t-statistic = 14.37) to 0.021 (t-statistic = 3.61); and the coefficient on *LMKVL* declines in magnitude from −0.004 (t-statistic = −7.57) to −0.001 (t-statistic = −2.23). Finally, when the model is estimated with $r_{DIVPREM}$ the coefficient on *EXGRW* is positive and the signs of the coefficients on the other risk measures are unaltered by the addition of *EXGRW* to the model. Thus, the results presented in Table 5 provide additional evidence that $r_{PEGPREM}$ and $r_{DIVPREM}$ are related to risk in a consistent and predictable manner.

Full Model Estimated with Levered Beta

Our use of *UBETA* instead of *MBETA* to proxy for market risk departs from analyses conducted in prior research. As noted earlier, we focus on *UBETA* to allow unambiguous directional predictions on market risk and leverage risk. Re-estimating regression Equation (20) with *MBETA* provides further insight into the strengths and weaknesses of the alternative r_{PREM} estimates, however.

When the $r_{DIVPREM}$ model is estimated with *UBETA*, the coefficients on *UBETA* and *DM* are significantly positive, consistent with theory. When the model is estimated with *MBETA*, the coefficient on *MBETA* is significantly positive, but *DM* loses statistical significance. This result is consistent with *MBETA* capturing both market and leverage risk as suggested by theory (Hamada 1972; Chung 1989).

In Table 5 the association between *UBETA* and $r_{GLSPREM}$ is negative; when *MBETA* is substituted for *UBETA* the coefficient on *MBETA* is positive. This reversal in sign is consistent with the *MBETA* absorbing the effect of both market risk and leverage risk. Similarly, substituting *MBETA* for *UBETA* in the $r_{GORPREM}$ regression mitigates the negative coefficient on market risk, albeit to a lesser extent, as the coefficient on *MBETA* is insignificant. In supplementary analysis involving the reduced-form models, the coefficient on *MBETA* is positive in some instances, but the result varies with the risk measures included. Notably, when *MBETA* is included in the $r_{GORPREM}$ model with no control for growth, the coefficient on *MBETA* is positive because it absorbs the positive association between r_{PREM} and three different types of risk: market risk, leverage risk, and the risk associated with growth. Gordon and Gordon (1997) document a positive association between $r_{GORPREM}$ and *MBETA*. Our analysis suggests the positive coefficient they observe may be due to one or more sources of risk, complicating the interpretation of this result.

When *MBETA* is substituted for *UBETA* in Equation (20) estimated with $r_{OJNPREM}$, the coefficient on *MBETA* continues to be negative, but, as with $r_{GORPREM}$, if *EXGRW* is dropped from the model, the coefficient on *MBETA* becomes positive. Our $r_{OJNPREM}$ results differ from those documented by Gode and Mohanram (2003). They document a positive association between *MBETA* and $r_{OJNPREM}$ after controlling for growth, whereas we find the positive association disappears once we control for growth. We believe the fundamental difference that leads to this discrepancy is the different composition of our samples. Gode and Mohanram (2003) limit their sample to larger firms. Through supplementary analysis (not tabled) we find that the correlation between $r_{OJNPREM}$ and leverage is magnified for larger firms. Accordingly, the confounding effect of lumping leverage risk and market risk together in *MBETA* is magnified for larger firms.

A Comment on the Role of R^2 in Assessing Alternative Methods of Estimating r_{PREM}

We place little weight on the magnitude of the R^2 when drawing conclusions regarding the relative reliability of the r_{PREM} estimates. Ranking on R^2 would suggest that $r_{OJNPREM}$ is second only to $r_{PEGPREM}$ in terms of reliability and that $r_{DIVPREM}$ is the least reliable estimate. Such a conclusion is unwarranted, however. Growth provides the majority of the explanatory power in the $r_{OJNPREM}$ model, which is *by construction* as $r_{OJNPREM}$ is an algebraic function of growth. Using R^2 to assess the reliability of the estimates is ill advised as assumptions placed on terminal value can yield induced correlations resulting in a high R^2. Moreover, a high R^2 does not require that the explanatory variables generating the high R^2 be theoretically related to the underlying construct or enter the model in the predicted manner.

A Comment on the Impact of Potential Biases in Analyst Forecasts or Prices

All of the methods we consider utilize analyst forecasts and current stock prices in estimating cost of equity capital, so may be affected by biases in forecasts or market inefficiencies reflected in stock prices. If analysts' forecasts are biased or prices reflect market inefficiencies, the resulting cost of equity capital estimates may be biased. Since the nature of the bias in the estimates is not immediately obvious we discuss this issue in the following paragraphs.

Bias in Forecasts Naively Impounded in Prices

If analysts' forecasts are biased, but stock prices naively reflect this bias, then the impact of the forecast bias on the estimates is mitigated. This is because the bias impacts both the left- and right-hand sides of the valuation equation.[9] Dechow and Sloan (1997) find that stock prices naively reflect analysts' biased forecasts of future earnings growth. This evidence suggests that bias in analysts' future earnings growth forecasts should not impact the resulting estimates because the forecast bias is reflected on both sides of the valuation equation.

Unsystematic Bias in Forecasts Not Impounded in Prices

If analysts' forecasts are biased but the market ignores the bias when setting prices, the resulting estimates will be biased. If the forecast bias is unsystematic, only the magnitude of the estimates is affected, however. For example, if analysts are generally optimistic, the resulting estimates are biased upward; the cross-sectional variation among the estimates is unaffected, however, as the entire distribution simply shifts to the right.

Systematic Bias in Forecasts not Impounded in Prices

If analysts' forecasts are systematically biased, both the magnitude and the cross-sectional distribution of the estimates are affected. For example, if analysts' forecasts tend to be optimistic *for high-growth firms*, the estimates are biased upward for these firms. Since the distribution shifts to the right for this group alone, the cross-sectional variation among the estimates is altered, creating a positive association between the resulting estimates and growth. We discuss the implications of this type of bias for our analysis and for empiricists employing cost of equity capital estimates in their research below.

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[9] This point is most obvious when considering the short-horizon dividend discount model given in Equation (2). However, since all of the estimation models are derived from the dividend discount model given in Equation (1), it implicitly applies to all of the estimation models we consider.

Systematic Bias in Prices Not Reflected in Analysts' Forecasts

If market prices are biased due to systematic market inefficiencies, but analysts' forecasts are unbiased, both the magnitude and cross-sectional variation of the estimates is biased. For example if, as the book-to-market return effect suggests, high (low) market-to-book firms are overpriced (underpriced) and analysts' forecasts of future cash flows are unbiased, the resulting estimates will be too low (high) for high (low) market-to-book firms. Since high market-to-book firms tend to be high-growth firms, the impact of this bias runs counter to that described in the preceding paragraph.

Implications

It is likely each type of bias exists in the data to some extent. Moreover, since each of the cost of equity capital estimation models employ different types of forecasts, the vulnerability of the models to certain types of bias varies across models. If one considers the combined effect on the estimates of a conglomeration of biases in analysts' forecasts and market prices and violations in the models' underlying assumptions, it is easy to understand why some models yield estimates that demonstrate erratic and unstable relationships with firm risk. It is unlikely, however, that the combined effect of such a collection could manufacture the stable and predictable relationships we document for $r_{DIVPREM}$ and $r_{PEGPREM}$. Even so, when systematic forecast and/or price biases exist, the driver of the systematic relationship (growth for example) should be included as a control variable in regression models involving the cost of equity capital estimates. In light of this, we recommend that empiricists carefully consider the nature of their sample and the potential for any such biases in conducting research that employs cost of equity capital estimates.

Supplementary Analysis of Correlation between r_{PREM} Estimates and Estimation Model Inputs

Table 6 presents the correlation between each of the r_{PREM} estimates and the analyst forecast data employed by the various cost of equity capital estimation models. $r_{DIVPREM}$, $r_{OJNPREM}$, and $r_{PEGPREM}$ are negatively correlated with all of the measures of short-horizon future cash flows employed in the various models (i.e., *DIV, EPS,* and *ROE*) and with the terminal cash flow as measured by target price. A negative association is expected, since given current price the higher the future cash flow the lower the expected cost of equity capital. In contrast, the correlation between $r_{GLSPREM}$ and $r_{GORPREM}$ and certain measures of short-horizon future cash flows is positive.

VII. SUMMARY AND CONCLUSIONS

Many questions of interest to the accounting community can be addressed in the presence of a reliable method of estimating the expected risk premium. A number of methods have been proposed, each carefully derived from the dividend discount model. However, in the process of translating theory into empirical estimation, key assumptions are inevitably invoked and violated. If these violations are severe, the resulting estimates may not approximate the "true" expected risk premium, and the reliability of empirical results generated from analyses employing the estimates may be questionable.

TABLE 6
Mean of Year-by-Year Spearman Correlation Coefficients between Various Specifications of Expected Risk Premium and Data Used in Various Estimation Methods

	DIV_1	DIV_2	DIV_5	EPS_1	EPS_2	EPS_5	ROE_1	ROE_2	Target Price
$r_{DIVPREM}$	−0.175 (0/10)	−0.180 (1/9)	−0.147 (1/9)	−0.247 (0/10)	−0.201 (0/10)	−0.078 (1/8)	−0.145 (0/8)	−0.073 (0/5)	−0.034 (2/6)
$r_{GLSPREM}$	0.181 (10/0)	0.177 (10/0)	0.189 (10/0)	0.162 (9/0)	0.194 (11/0)	0.195 (11/0)	−0.201 (0/11)	−0.202 (0/11)	−0.086 (0/7)
$r_{GORPREM}$	0.010 (5/2)	0.093 (5/2)	0.127 (6/2)	0.026 (6/3)	0.087 (6/2)	0.176 (11/0)	−0.225 (0/11)	−0.210 (0/11)	−0.136 (0/11)
$r_{OJNPREM}$	−0.057 (1/5)	−0.072 (1/8)	−0.038 (1/6)	−0.340 (0/11)	−0.276 (0/10)	−0.043 (1/5)	−0.449 (0/11)	−0.399 (0/11)	−0.189 (0/11)
$r_{PEGPREM}$	−0.400 (0/11)	−0.412 (0/11)	−0.356 (0/11)	−0.427 (0/11)	−0.345 (0/11)	−0.075 (1/9)	−0.414 (0/11)	−0.320 (0/11)	−0.166 (0/11)

Table values are the mean of year-by-year correlations. Numbers in parentheses are the number of times the correlation is significantly (positive/negative) in year-by-year correlations. The sample contains 12,400 firm/year observations from 1983–1993.

Variable definitions:

$r_{DIVPREM}$ = the estimated risk premium based on the target price method (Botosan and Plumlee 2002) less the risk-free rate;
$r_{GLSPREM}$ = estimated risk premium based on the industry method (Gebhardt et al. 2001) less the risk-free rate;
$r_{GORPREM}$ = estimated risk premium based on the finite horizon growth method (Gordon and Gordon 1997) less the risk-free rate;
$r_{OJNPREM}$ = estimated risk premium based on the Ohlson and Juettner-Nauroth (2003) economy-wide method less the risk-free rate;
$r_{PEGPREM}$ = estimated risk premium based on the PEG formula (Easton 2004) less the risk-free rate;
$DIV(_t)$ = the Value Line forecast of dividend for year (t);
$EPS(_t)$ = the Value Line forecast of earnings per share for year (t);
$ROE(_1)$ = the Value Line forecast of earnings per share for year 1, divided by the book value per share for year 0;
$ROE(_2)$ = the Value Line forecast of earnings per share for year 2, divided by the Value Line forecast of book value per share at year 1; and
Target Price = the 25th percentile of Value Line's forecasted long-run price range.

We assess the relative reliability of five popular approaches to estimating the risk premium. The basis for our assessment is the extent to which the estimates are associated with firm risk in a stable and meaningful manner. We find that the $r_{DIVPREM}$ and $r_{PEGPREM}$ estimates are consistently and predictably related to market risk, leverage risk, information risk, residual risk (as measured by firm size and/or book-to-price), and growth. Based on these results, we conclude that $r_{DIVPREM}$ and $r_{PEGPREM}$ dominate the alternatives, and recommend that individuals requiring firm-specific estimates of expected cost of equity capital rely on either of these two methods as opposed to the alternatives we examine.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 55–83

The Importance of Circulating and Presenting Manuscripts: Evidence from the Accounting Literature

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ABSTRACT: Editors exhort authors to circulate and present their working papers to colleagues before submitting them to journals (Zimmerman 1989; Green et al. 2002). Authors heeding such advice are said to increase the likelihood of getting their work published and making their research, once published, more influential (Zimmerman 1989). While evidence regarding these matters is of keen importance to authors, editors, and administrators, no research exists showing that circulating and presenting manuscripts increases their probability of being accepted in accounting journals or, when published, their influence on stimulating other research. I present such evidence by perusing acknowledgments in premier accounting journals.

I examine the relation between circulating and presenting manuscripts and the probability of acceptance by relating acknowledgments of 305 papers submitted to *The Accounting Review* during June 2002–May 2003 to the editor's reject versus revise and resubmit decision. I examine the relation between circulating and presenting manuscripts and an article's influence by relating the acknowledgments in 256 articles published in *The Accounting Review*, *Journal of Accounting Research*, and *Journal of Accounting and Economics* to citations to these articles.

My two analyses of acknowledgments to institutions, conferences, and individuals yield similar results. I find that papers presented at more workshops are more likely to be invited back to *The Accounting Review*, and that papers published in *The Accounting Review*, *Journal of Accounting and Economics*, or *Journal of Accounting Research* generate more citations if they were presented previously at more workshops.

I am grateful to Linda Bamber, Jan Barton, Jane Mutchler, Eric Press, Ed Swanson, Walt Blacconiere, and two anonymous referees for helpful comments; to Nan Liu, Frank Liyu Luo, and Pankaj Solanki for research assistance, and to Kate Flynn Connolly, editorial assistant of *The Accounting Review*, for providing me with data used in this study.

Editor's note: This paper was accepted by Terry Shevlin, Senior Editor.
This article should be of interest to researchers in their quest to publish. The article was subject to normal review.

Submitted February 2004
Accepted June 2004

> "Occasionally, an author submits a manuscript to a journal and no one, except the author, has read the paper. The paper contains no acknowledgments ..."
>
> —Zimmerman (1989, 460)

I. INTRODUCTION

A founding co-editor of *Journal of Accounting and Economics* advised authors to: "Circulate your papers to colleagues and ask them for both substantive and expositional comments. Give the paper in seminars at your school and other institutions before submitting to a journal" (Zimmerman, 1989, 461). Similarly, Hammermesch (1992, 170) advised young economists to present their papers and circulate them to colleagues: "A presentation can improve your work ... Present your work at seminars, professional meetings and conferences ... Do not be embarrassed to send your work to senior people." Editors of the three premier finance journals in a joint editorial published in Spring 2002 offered similar advice: "So how should authors maximize the value of the journal review process? They should circulate their papers and give seminars to colleagues to receive constructive criticism before submitting to a journal" (Green et al. 2002).

Journal editors provide similar advice at such forums as the American Accounting Association's New Faculty Consortium. In spite of these exhortations and their obvious importance to researchers, editors, and administrators, no evidence exists that manuscripts circulated more widely or presented at more workshops and conferences are more likely to get published, or once published, more likely to prompt further research, as proxied by higher citations (Zimmerman 1989). In this paper, I examine both of these related issues.

Evidence regarding the first issue requires access to rejected papers and papers faring better in the review process, i.e., those invited to be revised and resubmitted to journals, information available only to journal editors. As an editor of *The Accounting Review* (*TAR*), I have been granted access to data on all submissions to *TAR* from June 2002–May 2003, the first 12 months Terry Shevlin was its senior editor. Kate Flynn Connolly, administrative assistant of *TAR*, provided me with authors' names and their acknowledgments to institutions, conferences, and individuals. For 305 first-round submissions, I ran a logistic regression of the editor's reject versus revise-and-resubmit decision regarding these 305 papers on the number of: (1) institutions acknowledged, (2) conferences acknowledged, (3) individuals acknowledged, and (4) authors. In a sensitivity analysis (where I lose 99 papers), I add two variables representing the: (1) the research quality of the submitting authors' institutions as measured by the research rank of the authors' universities (source: Trieschmann et al. 2000), and (2) the research quality of the authors as measured by the number of their publications in *The Accounting Review*, *Journal of Accounting Research*, and *Journal of Accounting and Economics* in 1999–2001. Both analyses reveal that *TAR* editors are more likely to invite back papers that are presented at more institutions (workshops).

Evidence regarding the second issue requires access both to articles published in accounting journals and to a citation database. I examine this issue by perusing 256 articles published in *The Accounting Review*, *Journal of Accounting Research*, and *Journal of Accounting and Economics* in 2000–2002 to see if they are cited more often if they are circulated more widely among individuals or presented at more workshops and conferences.[1] I regress the number of citations on the number of institutions, conferences, and individuals acknowledged, and if the prior working paper was highly downloaded from the

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[1] Hasselback et al. (2000), Trieschmann et al. (2000), Ballas and Theoharakis (2003), and Brown (2003) identify these as the three premier accounting journals. I exclude 29 discussion comments because they do not elicit the same acknowledgments profile (e.g., they rarely acknowledge institutions).

Social Science Research Network, article length, number of authors, publishing journal, and year. In a sensitivity analysis (where I lose 17 published articles), I add two quality variables representing: (1) research quality of the submitting authors' institutions as measured by the research rank of authors' universities (source: Trieschmann et al. 2000), and (2) authors' own research quality as measured by their number of publications in *The Accounting Review*, *Journal of Accounting Research*, and *Journal of Accounting and Economics* in the three years prior to publication year. Both analyses show that citation increases with the number of institutions acknowledged, article length, highly downloaded from the Social Science Research Network, published in *TAR*, or published in 2000 or 2001 (rather than 2002).

My evidence suggests that presentations at more workshops are helpful both for increasing the probability that a paper initially submitted to a premier accounting journal fares better in the review process, and, if published in a premier accounting journal, it stimulates more research. Individuals invited to present their papers at workshops generally are asked to send their papers *after* they are invited so the quality of the specific paper presented is not known when the invitation is issued.[2] Individuals are invited because they are expected to present good papers, perhaps because they teach at high-quality institutions or they have demonstrated their high quality by publishing in premier journals. I control for quality of institution and individual to mitigate these concerns, but I do not show that comments received at workshops improve the paper so it is plausible that the *very act of presenting* leads authors to exert extra effort improving their manuscripts—perhaps driven by fear of negatively affecting one's reputation—and that workshops do not provide authors with any valuable comments. Even if this is so, it does not detract from my principal message: workshop presentations help authors improve the probability of publishing their manuscripts in premier journals and, when published, their papers' influence regardless of why workshops facilitate these desired results.[3]

I provide information on the number of institutions, conferences, and individuals that are acknowledged by manuscripts submitted to *The Accounting Review* along with summary statistics based on the *TAR* editor's reject versus revise-and-resubmit decision in the second section. I present results of a logistic regression of *TAR* editor's decision in the third section. I show the frequency and identity of institutions, conferences, and individuals acknowledged by papers published in the three premier accounting journals and I identify those acknowledged most often in the fourth section. I provide results of a negative binomial regression with citations as my dependent variable in the fifth section. I conclude in the sixth section.

II. FREQUENCY DISTRIBUTION AND SUMMARY STATISTICS OF ACKNOWLEDGMENTS TO 305 PAPERS SUBMITTED TO *THE ACCOUNTING REVIEW*

Figure 1 shows frequency distributions of the number of authors and the number of acknowledgments to institutions, conferences, and individuals. The number of authors ranges from 1 to 4, with a mean of 2.03 and a median of 2 (See Table 1, Panel A). 92 of the 305 initial submissions (30.16 percent) are sole-authored, 119 (39.02 percent) have two authors, 87 (28.52 percent) have three authors, and 7 (2.30 percent) have four authors.

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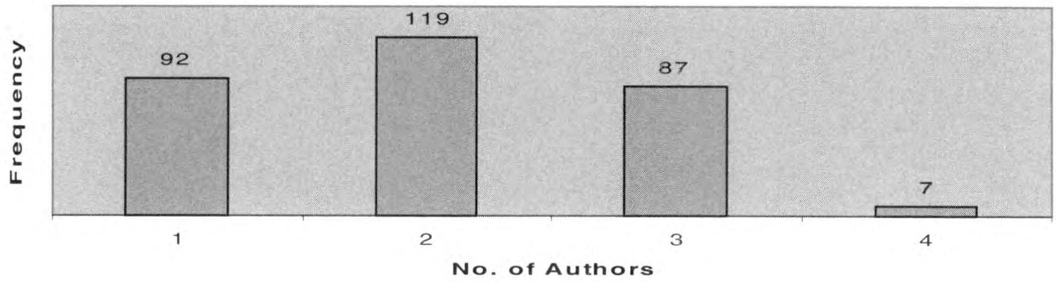
[2] My description is based on my personal experience of presenting my research at scores of workshops and my having invited people to present at my home institution at hundreds of workshops.

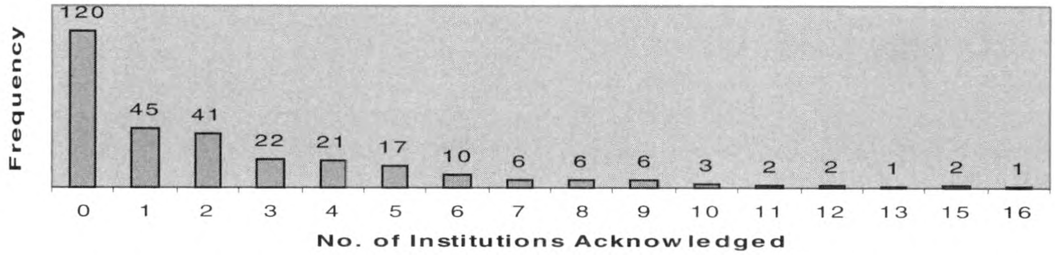
[3] My personal experience suggests otherwise. I found that the vast majority of the workshops I have given have provided me with valuable feedback that has allowed me to improve my papers.

FIGURE 1
Frequency Analyses of Papers Submitted to *TAR*, June 2002–May 2003

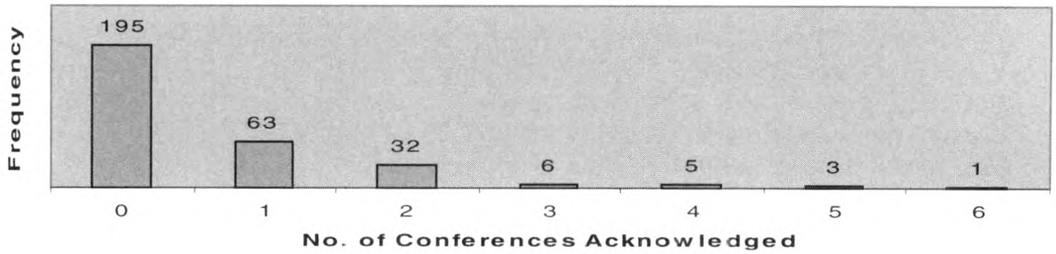
Frequency Distribution of Number of Authors



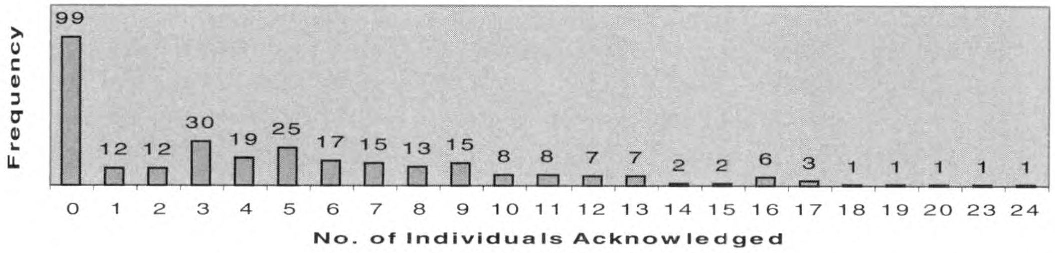
Frequency Distribution of Acknowledgements to Institutions



Frequency Distribution of Acknowledgements to Conferences



Frequency Distribution of Acknowledgements to Individuals



I define institutions as venues where an author presents a paper in a workshop attended by the institution's faculty and Ph.D. students. An acknowledgment to a single university is coded as an institution if it states or implies the presentation is made in a workshop setting. Acknowledgments to institutions range from zero to 16, with a mean of 2.30 and a median of 1. 120 submissions (39.34 percent) acknowledge zero institutions, 45 one (14.75 percent), 41 two (13.44 percent), 22 three (7.21 percent), 21 four (6.89 percent), 17 five (5.57 percent), 10 six (3.28 percent), 6 seven (1.97 percent), 6 eight (1.97 percent), 6 nine (1.97 percent), and 11 ten or more (3.61 percent).

I define conferences as venues where papers are presented in a format other than a workshop.[4] I include acknowledgments both to attributed conferences and to a single university if faculties from more than one university attend the presentation. Acknowledgments to conferences range from zero to six with a mean of 0.61 and a median of zero. 195 submissions (63.93 percent) acknowledge zero conferences, 63 one (20.66 percent), 32 two (10.49 percent), 6 three (1.97 percent), 5 four (1.64 percent), and 4 five or more (1.31 percent).

I define individuals as people acknowledged *without a specific attribution*. Thus, I exclude acknowledgments to Ph.D. thesis committee members, conference discussants, reviewers, editors, associate editors, research assistants, and secretaries.[5] While I exclude all acknowledgments to attributed individuals, I cannot ensure that some unattributed acknowledgments included are to individuals who should be excluded, such as editors and associate editors who authors do not acknowledge as such.[6] The number of acknowledgments to individuals ranges from 0 to 24 with a mean of 4.67 and a median of 3. Ninety-nine papers submitted to *TAR* (32.46 percent) acknowledge zero individuals, 12 one (3.93 percent), 12 two (3.93 percent), 30 three (9.84 percent), 19 four (6.23 percent), 25 five (8.20 percent), 17 six (5.57 percent), 15 seven (4.92 percent), 13 eight (4.26 percent), 15 nine (4.92 percent), and 48 ten or more (15.74 percent).

Table 1, Panel A, provides the mean, standard deviation, median, minimum, and maximum of the distribution of number of authors and acknowledgments to institutions, conferences, and individuals for the 231 initial submissions to *TAR* rejected on the first round (75.74 percent of the initial submissions) and the 74 manuscripts that the *TAR* editors invited the authors to revise and resubmit. A Kruskal-Wallis test shows that editors are more likely to recommend revise and resubmit than to reject papers if the manuscript acknowledges more institutions (mean = 4.08 versus 1.73, p value = 0.0001), more conferences (mean = 0.84 versus 0.54, p value = 0.0048), and more individuals (mean = 6.36 versus 4.13, p value = 0.0006). The number of authors is unrelated to the revise/reject decision (mean = 2.01 versus 2.03, p value = 0.8122).

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[4] I adopted these rules of thumb after perusing preliminary listings of institutions and conferences prepared by Liyu Luo, my research assistant. As examples, I coded Georgetown Accounting and Finance Workshop as an institution and the Duke-UNC Workshop as a conference. Most of the classifications were clear-cut so it is unlikely that the small number of papers requiring discretion impacted my results.

[5] I made this choice to mitigate the effects of the idiosyncratic nature of recognizing one's peers and the idiosyncratic nature of the editing process (e.g., *JAE* includes the reviewer by name if the author wishes to acknowledge the reviewer; *TAR* and *JAR* acknowledge anonymous reviewers). Assuming that attributed acknowledgments are more idiosyncratic than unattributed ones, excluding attributed acknowledgments reduces measurement error.

[6] Different editors have different policies regarding attributions. For example, when she was *TAR* editor, Linda Bamber allowed unattributed acknowledgments only if she made comments to authors when she was not acting as editor (e.g., detailed comments made when papers were presented at University of Georgia workshops).

TABLE 1
Summary Statistics and Correlation Matrix of Papers Submitted to *TAR*
June 2002–May 2003

Panel A: Summary Statistics Categorized by *TAR* Editor's Decision

All Submissions (n = 305)

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
INSTITUTIONS	2.30	3.03	1	0	16
CONFERENCES	0.61	1.03	0	0	6
INDIVIDUALS	4.67	4.93	3	0	24
AUTHORS	2.03	0.82	2	1	4

Editor's Decision: Reject (n = 231)

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
INSTITUTIONS	1.73	2.38	1	0	13
CONFERENCES	0.54	0.99	0	0	5
INDIVIDUALS	4.13	4.63	3	0	20
AUTHORS	2.03	0.81	2	1	4

Editor's Decision: Revise and Resubmit (n = 74)

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
INSTITUTIONS	4.08	4.01	3	0	16
CONFERENCES	0.84	1.14	0.5	0	6
INDIVIDUALS	6.36	5.47	5	0	24
AUTHORS	2.01	0.88	2	1	4

Kruskal-Wallis Test Results

Variable	Kruskal-Wallis statistic	p-value
INSTITUTIONS	24.643	0.0001
CONFERENCES	7.944	0.0048
INDIVIDUALS	11.805	0.0006
AUTHORS	0.057	0.8122

Panel B: Correlation Matrix

	DECISION	*AUTHORS*	*INSTITUTIONS*	*CONFERENCES*	*INDIVIDUALS*
DECISION	1.0	−0.01	0.33***	0.13**	0.19***
AUTHORS	−0.01	1.0	−0.11*	0.04	−0.06
INSTITUTIONS	0.28***	−0.03	1.0	0.27***	0.59***
CONFERENCES	0.16***	0.06	0.32***	1.0	0.32***
INDIVIDUALS	0.20***	−0.05	0.60***	0.37***	1.0

*, **, and *** Indicate significance at 10%, 5%, and 1% levels, respectively (two-tailed tests).

Pearson correlation coefficients are shown in upper triangle.

Spearman coefficients are shown in lower triangle.

DECISION = 1 if the *TAR* editor's decision is to revise and resubmit, and 0 if the *TAR* editor's decision is to reject;

INSTITUTIONS, *CONFERENCES*, and *INDIVIDUALS* = number of institutions, conferences, and individuals acknowledged, respectively; and

AUTHORS = the number of authors.

Table 1, Panel B, provides the correlation matrix of the dependent variable, the editorial decision (*DECISION*), and the four independent variables, namely the number of: (1) institutions acknowledged (*INSTITUTIONS*), (2) conferences acknowledged (*CONFERENCES*), (3) individuals acknowledged (*INDIVIDUALS*) and (4) authors (*AUTHORS*). Pearson correlation coefficients appear in the upper triangle; Spearman correlation coefficients appear in the lower triangle. Consistent with the Kruskal-Wallis test results, *DECISION* is positively related to all of the acknowledgment variables, but not to the number of coauthors. Large positive correlations exist among the three acknowledgment variables, especially between *INDIVIDUALS* and *INSTITUTIONS*, so I estimate (in Table 2) seven logistic regressions: all acknowledgment variables (Table 2, Panel A), only two acknowledgment variables at a time (Table 2, Panel B), and only one acknowledgment variable at a time (Table 2, Panel C).

III. LOGISTIC REGRESSION RESULTS FOR PAPERS SUBMITTED TO *THE ACCOUNTING REVIEW*

Papers submitted to *The Accounting Review* are sent to reviewers with the cover page removed so reviewers do not know (at least via the review process) authors' names, number of authors, or acknowledgments authors make to institutions, conferences, and individuals. Unless they obtain this information elsewhere (e.g., via google.com or ssrn.com), reviewers make their recommendations to the *TAR* editors without knowledge of acknowledgments so they cannot influence directly the reviewers' recommendations.[7] I model the *TAR* editors' decisions regarding initial submissions using the logistic regression:

$$\begin{aligned} DECISION = {} & b0+b1*INSTITUTIONS+b2*CONFERENCES+b3*INDIVIDUALS \\ & +b4*AUTHORS \end{aligned}$$

where:

DECISION = coded 0 for a reject decision; 1 for a revise and resubmit decision;
INSTITUTIONS = number of institutions acknowledged;
CONFERENCES = number of conferences acknowledged;
INDIVIDUALS = number of individuals acknowledged; and
AUTHORS = number of authors.

I expect the probability of a favorable editorial decision to increase with the number of acknowledgments so I expect *DECISION* to be related positively to *INSTITUTIONS, CONFERENCES,* and *INDIVIDUALS.* I expect *INSTITUTIONS* to be the most important acknowledgments variable and *INDIVIDUALS* to be the least important one. Acknowledgments to individuals are more likely than other types of acknowledgments to be subject to authors' strategic behavior. Authors acknowledge individuals for a variety of reasons aside from the value of their contributions, such as appeal to authority, attempts to curry favor with editors, and a desire to increase/decrease the probability that the editor will select acknowledged individuals as reviewers. Authors are unlikely to enumerate all individuals who provide them with valuable comments. For example, they may list the institution where they present the paper rather than delineate any attendees who provided them with helpful comments during the workshop.

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[7] I assume that *TAR* editors do not consider acknowledgments when making their decisions, relying instead on the reviewers' reports and their own independent assessments of papers' merits.

Authors are likely to list correctly the workshops and conferences where they present their papers so I expect *INSTITUTIONS* and *CONFERENCES* to have less measurement error than *INDIVIDUALS*. In general, authors receive more valuable comments when presenting at *INSTITUTIONS* than at *CONFERENCES* because: (1) they have more time in workshops than at most conferences (e.g., 1½ hours in the typical workshop versus 20 minutes at AAA conferences), (2) more people have read the paper, (3) more interchange exists between the presenter and the audience, and (4) there is more peer pressure. I expect *INSTITUTIONS* to have a stronger effect than *CONFERENCES*.

I expect *DECISION* to be related positively to *AUTHORS* because additional authors should increase a paper's scope, creativity, and improve its overall quality. However, additional authors may substitute for authors getting help from others (Hartley 2003) so *AUTHORS* may not be an important factor.

Table 2 reports the results of the logistic regressions. Panel A presents the results when all the acknowledgments variables are included, revealing that *INSTITUTIONS* is the only significant variable ($p < 0.01$). This finding is consistent with the correlations in Panel B of Table 1, which showed that *DECISION* is more highly correlated with *INSTITUTIONS* than with either *INDIVIDUALS* or *CONFERENCES* (Pearson correlations = 0.33, 0.19, and 0.13, respectively). The odds ratio indicates that the probability of receiving a revise and resubmit versus a reject decision rises by 1.262 when a paper is presented at one additional workshop.[8] Evaluated at median values of all the independent variables (1 for *INSTITUTIONS*, 0 for *CONFERENCES*, 3 for *INDIVIDUALS*, and 2 for *AUTHORS*, respectively), the probability of receiving a revise and resubmit increases by 20.9 percent (from 0.1681 to 0.2033) when a paper is presented at one additional workshop (i.e., *INSTITUTIONS* increase from 1 to 2 and the other variables remain unchanged), and decreases by 17.9 percent (from 0.1681 to 0.1380) when it is presented at zero workshops (i.e., *INSTITUTIONS* drop from 1 to 0 and the other variables remain unchanged).

Panels B–D respectively present results omitting one of the acknowledgment variables at a time: *INSTITUTIONS* (Panel B), *CONFERENCES* (Panel C), and *INDIVIDUALS* (Panel D). When *INSTITUTIONS* is included in the model (Panels C and D), it is the only significant explanatory variable. When it is omitted (Panel B), *INDIVIDUALS* becomes significant. *CONFERENCES* is insignificant in both panels where it is included (Panels B and D).

Panels E–G respectively present results including authors and only one of the acknowledgment variables: *INSTITUTIONS* (Panel E), *CONFERENCES* (Panel F), and *INDIVIDUALS* (Panel G). Consistent with the univariate results (see Table 1, Panel B), each acknowledgment variable is significant when it is the only such variable included in the regression. In sum, the *TAR* editors' *DECISION* is significantly positively related to the number of workshops where the paper was presented. There is weak evidence that *DECISION* is related to the number of individuals acknowledged and weaker evidence it is related to the number of conferences where the paper is presented.

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[8] Odds are defined as $\text{Prob}(y = 1)/\text{Prob}(y = 0)$, where y is the binary dependent variable. Odds ratio is the amount by which the odds are multiplied, with each 1-unit increase in that x variable (if other x variables' values stay the same).

IV. FREQUENCY DISTRIBUTION OF ACKNOWLEDGMENTS IN PUBLISHED ARTICLES

Acknowledgments to Institutions

Table 3, Panel A, provides the frequency distribution of acknowledgments to institutions by articles published in the three premier accounting journals during 2000–02. The distribution of institutions acknowledged ranges from 0 to 20, with a mean of 4.63 and a median of four. Panel A also provides acknowledgments to institutions by journal. The distributions of acknowledgments to institutions by the three journals are similar. A Kruskal-Wallis test

TABLE 2
Logistic Regression of Papers Submitted to TAR June 2002–May 2003

Panel A
Model: *DECISION* = b0+b1**INSTITUTIONS*+b2**CONFERENCES*+b3**INDIVIDUALS* +b4**AUTHORS*

Variable	Expected Signs	Coefficient	z-statistic	Odds Ratio
Intercept	?	−1.988***	−4.67	
INSTITUTIONS	+	0.233***	4.20	1.262
CONFERENCES	+	0.097	0.70	1.101
INDIVIDUALS	+	−0.002	−0.05	0.998
AUTHORS	+	0.081	0.48	1.084

n = 305, Pseudo R^2 = 0.0933, Log likelihood = −153.22

Panel B
Model: *DECISION* = b0+b1**CONFERENCES*+b2**INDIVIDUALS*+b3**AUTHORS*

Variable	Expected Signs	Coefficient	z-statistic	Odds Ratio
Intercept	?	−1.622***	−4.05	
CONFERENCES	+	0.147	1.15	1.158
INDIVIDUALS	+	0.076***	2.79	1.080
AUTHORS	+	−0.005	−0.03	0.995

n = 305, Pseudo R^2 = 0.0361, Log likelihood = −162.89

Panel C
Model: *DECISION* = b0+b1**INSTITUTIONS*+b2**INDIVIDUALS*+b3**AUTHORS*

Variable	Expected Signs	Coefficient	z-statistic	Odds Ratio
Intercept	?	−1.972***	−4.65	
INSTITUTIONS	+	0.237***	4.28	1.267
INDIVIDUALS	+	0.002	0.07	1.002
AUTHORS	+	0.090	0.53	1.094

n = 305, Pseudo R^2 = 0.0919, Log likelihood = −153.47

Panel D
Model: *DECISION* = b0+b1**INSTITUTIONS*+b2**CONFERENCES*+b3**AUTHORS*

Variable	Expected Signs	Coefficient	z-statistic	Odds Ratio
Intercept	?	−1.992***	−4.77	
INSTITUTIONS	+	0.231***	4.93	1.260
CONFERENCES	+	0.095	0.71	1.100
AUTHORS	+	0.081	0.48	1.085

n = 305, Pseudo R^2 = 0.0933, Log likelihood = −153.23

(*continued on next page*)

TABLE 2 (continued)

Panel E
Model: *DECISION* = b0+b1**INSTITUTIONS*+b2**AUTHORS*

Variable	Expected Signs	Coefficient	z-statistic	Odds Ratio
Intercept	?	−1.966***	−4.74	
INSTITUTIONS	+	0.239***	5.23	1.270
AUTHORS	+	0.090	0.53	1.094
n = 305, Pseudo R^2 = 0.0919, Log likelihood = −153.47				

Panel F
Model: *DECISION* = b0+b1**CONFERENCES*+b2**AUTHORS*

Variable	Expected Signs	Coefficient	z-statistic	Odds Ratio
Intercept	?	−1.221***	−3.35	
CONFERENCES	+	0.257**	2.15	1.293
AUTHORS	+	−0.045	−0.27	0.956
n = 305, Pseudo R^2 = 0.0133, Log likelihood = −166.74				

Panel G
Model: *DECISION* = b0+b1**INDIVIDUALS*+b2**AUTHORS*

Variable	Expected Signs	Coefficient	z-statistic	Odds Ratio
Intercept	?	−1.593***	−4.00	
INDIVIDUALS	+	0.086***	3.29	1.090
AUTHORS	+	0.005	0.03	1.005
n = 305, Pseudo R^2 = 0.0323, Log likelihood = −163.54				

** and *** indicate significance at 5% and 1% levels, respectively (one-tailed test).
Logistic regression estimates the probability that *DECISION* = 1 based on the explanatory variables.
DECISION = 1 if the *TAR* editor's decision is to revise and resubmit, and 0 if the *TAR* editor's decision is to reject;
INSTITUTIONS, *CONFERENCES*, and *INDIVIDUALS* = number of institutions, conferences, and individuals acknowledged, respectively;
AUTHORS = the number of authors; and
Odds ratio = the probability that *DECISION* equals 1 divided by the probability that *DECISION* = 0.

fails to reject the null hypothesis that the number of institutions acknowledged by the typical paper in each journal is identical (Kruskal-Wallis statistic = 2.988; p = 0.2244).

Table 4 lists those 40 institutions acknowledged at least 10 times. Eight are acknowledged at least 25 times: Pennsylvania State University (31), The University of Texas (30), University of Washington (29), University of Chicago (28), The Ohio State University (28), Indiana University (26), Washington University (26), and Stanford University (25), and 14 others are acknowledged 20–24 times. Ten are acknowledged 15–19 times, and eight others are acknowledged 10–14 times. All 22 universities acknowledged at least 20 times have Ph.D. programs in accounting. With the sole exception of University of Notre Dame, all 18 universities acknowledged 10–19 times have Ph.D. programs in accounting.[9]

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[9] Trieschmann et al. (2000) assess research productivity of academic institutions in the U.S. by examining publications in research journals between 1986 and 1998. They provide rankings both for institutions as a whole and by academic discipline, ranking 96 U.S. academic institutions offering accounting degrees based on publications in the three premier accounting journals. Thirty-five of their top 40 universities are on my Table 4 list of 38 U.S. universities.

TABLE 3

Frequency Distribution of Acknowledgments to Institutions, Conferences, and Individuals by Articles Published in *JAE, JAR,* and *TAR*

Panel A: Frequency Distribution of Acknowledgments to Institutions

No. of Institutions	All Three Journals		*JAE*		*JAR*		*TAR*	
Acknowledged	**Freq**	**Percentage**	**Freq**	**Percentage**	**Freq**	**Percentage**	**Freq**	**Percentage**
0	36	14.06	12	22.64	15	13.76	9	9.57
1	26	10.16	8	15.09	10	9.17	8	8.51
2	24	9.38	3	5.66	8	7.34	13	13.83
3	26	10.16	6	11.32	10	9.17	10	10.64
4	26	10.16	4	7.55	14	12.84	8	8.51
5	33	12.89	3	5.66	14	12.84	16	17.02
6	14	5.47	5	9.43	4	3.67	5	5.32
7	15	5.86	1	1.89	8	7.34	6	6.38
8	17	6.64	5	9.43	6	5.50	6	6.38
9	12	4.69	0	0.00	7	6.42	5	5.32
10 or more	27	10.54	6	11.33	13	11.91	8	8.50
Mean		4.63		4.00		4.83		4.77
Median		4		3		4		4

Kruskal-Wallis statistic = 2.988 (p = 0.2244)

Panel B: Frequency Distribution of Acknowledgments to Conferences

No. of Conferences	All Three Journals		*JAE*		*JAR*		*TAR*	
Acknowledged	**Freq**	**Percentage**	**Freq**	**Percentage**	**Freq**	**Percentage**	**Freq**	**Percentage**
0	92	35.94	20	37.74	39	35.78	33	35.11
1	71	27.73	19	35.85	30	27.52	22	23.40
2	52	20.31	4	7.55	18	16.51	30	31.91
3	28	10.94	5	9.43	15	13.76	8	8.51
4	9	3.52	3	5.66	6	5.50	0	0
5 or more	4	1.56	2	3.78	1	0.92	1	1.06
Mean		1.25		1.28		1.29		1.18
Median		1		1		1		1

Kruskal-Wallis statistic = 0.422 (p = 0.8098)

Panel C: Frequency Distribution of Acknowledgments to Individuals

No. of Individuals	All Three Journals		*JAE*		*JAR*		*TAR*	
Acknowledged	**Freq**	**Percentage**	**Freq**	**Percentage**	**Freq**	**Percentage**	**Freq**	**Percentage**
0	20	7.81	5	9.43	10	9.17	5	5.32
1	17	6.64	2	3.77	7	6.42	8	8.51
2	14	5.47	1	1.89	5	4.59	8	8.51
3	11	4.30	4	7.55	3	2.75	4	4.26
4	11	4.30	2	3.77	6	5.50	3	3.19

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TABLE 3 (continued)

Panel C: Frequency Distribution of Acknowledgments to Individuals (continued)

No. of Individuals Acknowledged	All Three Journals		*JAE*		*JAR*		*TAR*	
	Freq	Percentage	Freq	Percentage	Freq	Percentage	Freq	Percentage
5	18	7.03	5	9.43	8	7.34	5	5.32
6	17	6.64	3	5.66	7	6.42	7	7.45
7	24	9.38	5	9.43	10	9.17	9	9.57
8	18	7.03	2	3.77	10	9.17	6	6.38
9	13	5.08	1	1.89	9	8.26	3	3.19
10 or more	90	36.32	23	43.39	34	31.19	36	38.28
Mean		8.54		8.85		7.96		9.02
Median		7		7		7		7

Kruskal-Wallis statistic = 0.772 (p = 0.6798)

My source is the 256 articles (excluding 29 discussion comments) published in *Journal of Accounting and Economics*, *Journal of Accounting Research*, and *The Accounting Review* between 2000 and 2002. Institutions are defined as those venues where an author presents his/her working paper in a workshop format. This venue generally consists of the presenter and the institution's faculty members and Ph.D. students. If an acknowledgment is made to a single institution and a workshop setting is stated or implied, I code the venue as an institution. Conferences are defined as venues where authors present their papers in a format other than a workshop. An acknowledgment with only one institution in its name, but which does not acknowledge a workshop, and which faculties from more than one institution attend is coded as a conference. Individuals are defined as people acknowledged without a specific attribution. Thus, I exclude attributed acknowledgments to Ph.D. thesis committee members, conference discussants, reviewers, editors, associate editors, research assistants, and secretaries.

Acknowledgments to Conferences

Table 3, Panel B, provides the frequency distribution of acknowledgments to conferences. The distribution of conferences acknowledged ranges from zero to eight, with a mean of 1.25 and a median of 1. Panel B also shows acknowledgments by journal. The distributions are similar for the three journals. A Kruskal-Wallis test does not reject the null hypotheses that the number of conferences acknowledged by the typical paper in each journal is identical (Kruskal-Wallis statistic = 0.422; p = 0.8098).

Table 5 lists the 39 conferences that are acknowledged at least twice. Five are acknowledged at least ten times: AAA Annual Meeting (77), Conference on Financial Economics and Accounting (27), *Journal of Accounting Research* Conference (13), AAA Management Accounting Research Seminar (12), and Stanford Summer Camp (10), 13 conferences are acknowledged five to nine times, 3 are acknowledged four times, 6 three times, and 12 twice.[10]

Acknowledgments to Individuals

Table 3, Panel C, provides the frequency distribution of acknowledgments to individuals. The distribution of individuals acknowledged ranges from zero to 31, with a mean of

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[10] Not all conference papers acknowledged the specific conference. All six of *TAR* Quality of Earnings Conference articles acknowledged the conference, but only five of nine *JAE* conference articles and 13 of 14 *JAR* conference articles acknowledged the *JAE* and *JAR* conferences where the papers were presented.

TABLE 4
Acknowledgments to Specific Institutions by Articles Published in *JAE*, *JAR*, and *TAR*

	Number of Acknowledgments			
Institutions	**All Three Journals**	***JAE***	***JAR***	***TAR***
Pennsylvania State University	31	8	14	9
The University of Texas	30	2	15	13
University of Washington	29	5	12	12
University of Chicago	28	5	17	6
The Ohio State University	28	3	19	6
Indiana University	26	4	9	13
Washington University	26	5	11	10
Stanford University	25	2	16	7
Columbia University	24	4	14	6
Harvard University	24	2	15	7
University of California, Berkeley	23	3	13	7
Emory University	23	4	12	7
Northwestern University	23	3	12	8
The University of Iowa	23	4	9	10
University of Michigan	23	4	11	8
University of Pennsylvania	23	3	13	7
The University of Arizona	22	5	9	8
Cornell University	21	4	7	10
New York University	21	3	14	4
University of Rochester	21	7	8	6
Georgia State University	20	4	8	8
University of Colorado	20	6	7	7
University of Georgia	19	2	4	13
Baruch College of CUNY	18	4	6	8
University of Minnesota	17	1	9	7
University of Southern California	16	2	5	9
Carnegie Mellon University	15	6	4	5
Duke University	15	4	7	4
University of Illinois	15	0	6	9
Michigan State University	15	2	3	10
University of Notre Dame	15	3	7	5
University of Wisconsin	15	1	8	6
University of British Columbia	14	4	4	6
Massachusetts Institute of Technology	14	5	6	3
Hong Kong University of Science & Technology	13	1	6	6
University of Florida	13	2	6	5
University of California, Los Angeles	12	4	5	3
University of Maryland	11	1	4	6
Arizona State University	10	2	4	4
University of Utah	10	2	5	3

(*continued on next page*)

TABLE 4 (continued)

The 40 institutions acknowledged at least 10 times by *Journal of Accounting and Economics*, *Journal of Accounting Research*, and *The Accounting Review* between 2000 and 2002 are listed in decreasing order of number of acknowledgments. Institutions are defined as those venues where an author presents his/her working paper in a workshop format. This venue generally consists of the presenter and the institution's faculty members and Ph.D. students. If an acknowledgment is made to a single institution and a workshop setting is stated or implied, I code the venue as an institution.

8.54 and a median of 7. Panel C also provides acknowledgments by journal. The distributions are similar for each journal. A Kruskal-Wallis test does not reject the null hypothesis that the number of individuals acknowledged by the typical paper in each journal is identical (Kruskal-Wallis statistic = 0.772; p = 0.6798).

Table 6 lists 43 individuals acknowledged at least eight times. I indicate in the table any individuals who controlled the accept/reject decision process when these papers were published. My information source is the editors' names in the first journal issue in 2000 and the last journal issue in 2002, plus associate editors when Linda Bamber was *TAR* editor.[11] Five people are acknowledged 15 or more times: J. Zimmerman (19 times), J. Salamon (18), M. Barth (16), S. P. Kothari (16), and T. Shevlin (15). Three are journal editors at least sometime during my sample period. J. Zimmerman and S. P. Kothari are editors of *JAE* during the entire sample period, but the majority of their acknowledgments are by other journals (i.e., 10 of 19 and 10 of 16, respectively). In contrast, J. Salamon, *TAR* editor in 2000, has two-thirds of his acknowledgments by papers published in *TAR* (12 of 18).[12]

Five individuals were acknowledged 12 times: L. Brown, J. Core, J. Ohlson, A Smith, and N. Stuart. A. Smith, the only journal editor, is acknowledged most often by papers published in *JAR* (9 of 12 times), where she was editor during the entire sample period. Seven individuals are acknowledged 11 times: R. Ball, T. Dyckman, R. Leftwich, M. McNichols, K. Schipper, J. Thomas, and R. Tubbs. Both R. Ball and K. Schipper are editors of *JAR* for part of my sample period (Ball 2001–2002; Schipper 2000), but the majority of their acknowledgments are by people publishing in *JAE* and *TAR* (8 of 11).[13] In contrast, R. Leftwich had over 90 percent (10 of 11) of his acknowledgments by *JAR*, a journal he edited during 2001–2002. Three people are acknowledged 10 times: L. Bamber, B. Beaver, and B. Kinney. L. Bamber was the only journal editor in this group (of *TAR* during 2001–2002); she is acknowledged most often by that journal (6 of 10 times).

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[11] Personal conversations with Jerry Salamon (*TAR* editor, 2000) and Linda Bamber (*TAR* editor, 2002) revealed that, unlike Linda Bamber, Jerry Salamon sometimes overruled decisions of associate editors so I consider Jerry Salamon to be the *TAR* decision maker when he was editor, but I consider both Linda Bamber and her AEs to be decision makers when she was editor. Mary Barth and Jamie Pratt also would be designated with *TAR* superscripts if I considered all the *TAR* AEs who are in the table to be decision makers when Jerry Salamon was editor.

[12] Recall that I omit acknowledgments to editors if the author attributes it to the editor, but that I cannot determine if unattributed acknowledgments to editors (or others, such as Ph.D. advisors) should have been attributed ones.

[13] The majority of acknowledgments to R. Ball (7 of 11) are by *JAE*, a journal he edited prior to becoming a *JAR* editor.

TABLE 5
Acknowledgments to Specific Conferences by Articles Published in *JAE, JAR,* and *TAR*

Conferences	**Number of Acknowledgments**			
	All Three Journals	***JAE***	***JAR***	***TAR***
AAA National	77	18	32	27
Conference on Financial Economics and Accounting	27	5	12	10
JAR Conference	13	0	13	0
AAA Management Accounting Research Seminar	12	2	4	6
Stanford Summer Camp	10	3	5	2
European Accounting Association Meeting	9	2	6	1
HKUST Accounting Symposium	9	4	3	2
AAA Auditing Section Midyear Meeting	7	3	2	2
University of Illinois Symposium on Auditing Research	7	1	3	3
Big 10 Research Conference	6	1	1	4
The Accounting Review Conference on Quality of Earnings	6	0	0	6
UBC-Oregon-Washington Conference	6	0	3	3
AAA Globalization Conference	5	0	2	3
AAA Regional	5	2	1	2
Boston Area Research Colloquium	5	0	2	3
Business Measurement and Assurance Services Conference	5	1	1	3
International Conference on Contemporary Accounting Issues	5	1	3	1
JAE Conference	5	5	0	0
Columbia University Burton Summer Accounting Conference	4	0	3	1
Duke University—The University of North Carolina Fall Camp	4	2	1	1
Intangibles Conference	4	0	3	1
Annual Winter Accounting Conference at Utah	3	0	2	1
EIASM Accounting and Economics Conference	3	1	1	1
European Finance Association Meeting	3	2	0	1
International Symposium on Auditing	3	1	2	0
Southeast Summer Accounting Research Colloquium	3	0	1	2
University of Illinois Tax Symposium	3	0	2	1
Accounting Association of Australia and New Zealand	2	2	0	0
American Finance Association Annual Meeting	2	1	1	0
Berkeley Accounting Research Talks	2	0	2	0
Economics Science Association Meeting	2	0	0	2
Financial Management Association Annual Meeting	2	0	2	0
Harvard Business School Financial Decisions and Control Conference	2	0	2	0
Indiana University-Notre Dame-Purdue University Accounting Research Conference	2	0	0	2
KPMG-AAA International Conference	2	1	1	0
New England Behavioral Accounting Research Series	2	0	0	2

(continued on next page)

TABLE 5 (continued)

Conferences	Number of Acknowledgments All Three Journals	*JAE*	*JAR*	*TAR*
Salomon Smith Barney Global Quantitative Research Conference	2	0	1	1
University of Michigan Spring Training	2	1	0	1
University of Minnesota Accounting Theory Mini Conference	2	0	2	0

The 39 conferences acknowledged at least twice by *Journal of Accounting and Economics*, *Journal of Accounting Research*, and *The Accounting Review* between 2000 and 2002 are presented in decreasing order of number of acknowledgments. Conferences are defined as venues where authors present their papers in a format other than a workshop.

TABLE 6
Acknowledgments to Specific Individuals by Articles Published in *JAE*, *JAR*, and *TAR*

Individuals	Number of Acknowledgments All Three Journals	*JAE*	*JAR*	*TAR*
Zimmerman, Jerry^{JAE}	19	9	5	5
Salamon, Jerry^{TAR}	18	4	2	12
Barth, Mary	16	2	11	3
Kothari, S. P.^{JAE}	16	6	6	4
Shevlin, Terry	15	2	4	9
Brown, Larry	12	0	9	3
Core, John	12	3	7	2
Ohlson, Jim	12	2	8	2
Smith, Abbie^{JAR}	12	1	9	2
Stuart, Nathan	12	2	3	7
Ball, Ray^{JAR}	11	7	3	1
Dyckman, Tom	11	3	3	5
Leftwich, Richard^{JAR}	11	1	10	0
McNichols, Maureen	11	1	7	3
Schipper, Katherine^{JAR}	11	3	3	5
Thomas, Jake	11	3	5	3
Tubbs, Rick	11	2	3	6
Bamber, Linda^{TAR}	10	0	4	6
Beaver, Bill	10	0	7	3
Kinney, Bill	10	0	3	7
Basu, Sudipta	9	2	4	3
Biddle, Gary	9	2	4	3
Bowen, Bob	9	1	4	4
Libby, Bob	9	0	1	8
Nelson, Mark^{TAR}	9	0	2	7
Peecher, Mark	9	0	3	6
Verrecchia, Robert	9	2	4	3

(*continued on next page*)

TABLE 6 (continued)

Individuals	**Number of Acknowledgments** **All Three Journals**	***JAE***	***JAR***	***TAR***
Wahlen, Jim	9	2	0	7
Watts, Ross^{JAE}	9	8	0	1
Burgstahler, Dave	8	2	2	4
Dye, Ronald	8	5	2	1
Hughes, Jack	8	3	4	1
Kennedy, Jane	8	0	1	7
Koonce, Lisa	8	0	2	6
Lambert, Rick	8	3	4	1
Lipe, Bob	8	1	4	3
Luft, Joan^{TAR}	8	0	0	8
McKeown, Jim	8	3	2	3
Mills, Lil	8	1	2	5
Pincus, Mort	8	1	4	3
Pownall, Grace^{TAR}	8	0	4	4
Pratt, Jamie	8	1	0	7
Waymire, Greg	8	4	2	2

The 43 individuals acknowledged at least 8 times by *Journal of Accounting and Economics*, *Journal of Accounting Research*, and *The Accounting Review* between 2000 and 2002 are listed in decreasing order of number of acknowledgments. Individuals are defined as people acknowledged without a specific attribution. Thus, I exclude attributed acknowledgments to Ph.D. thesis committee members, conference discussants, reviewers, editors, associate editors, research assistants, and secretaries. Superscripts designate decision makers for *JAE*, *JAR*, and *TAR*, namely the editors of the three journals and the associate editors of *TAR* when Linda Bamber was *TAR* editor. Information for decision makers was obtained from the first journal issues in 2000 and the last journal issues in 2002.

V. CITATIONS AND ACKNOWLEDGMENTS

Citations Model

I model citations (*CITATIONS*: cumulative citations to each of the 256 articles; source: Social Science Citations Index accessed on May 31, 2003) based on three acknowledgment and seven other variables:

$$\begin{aligned} CITATIONS = {} & b0+b1*INSTITUTIONS+b2*CONFERENCES+b3*INDIVIDUALS \\ & + b4*PAGE+b5*AUTHORS+b6*SSRN+b7*DJAE+b8*DTAR \\ & +b9*D2000+b10*D2001 \end{aligned}$$

where:

Dependent variable:

CITATIONS = cumulative number of citations to each published article (source: Social Science Citation Index).

Acknowledgments variables:

INSTITUTIONS = number of institutions acknowledged;

CONFERENCES = number of conferences acknowledged; and

INDIVIDUALS = number of individuals acknowledged.

Other variables:

PAGE = page length of article;
AUTHORS = number of authors;
SSRN = dummy variable equal to 1 if working paper was highly downloaded from ssrn.com, 0 otherwise;
DJAE = dummy variable equal to 1 if published in *Journal of Accounting and Economics*, 0 otherwise;
DTAR = dummy variable equal to 1 if published in *The Accounting Review*, 0 otherwise;
D2000 = dummy variable equal to 1 if published in 2000, 0 otherwise; and
D2001 = dummy variable equal to 1 if published in 2001, 0 otherwise.

I expect citation to be related positively to the acknowledgment variables and to the number of authors for the same reasons I expect the editor's revise and resubmit versus reject decision to be related to these same variables. I expect citation to be related positively to article length because: (1) editors are more likely to require articles they deem to be of lesser influence to be reduced in size, and (2) longer articles can be cited for more reasons (e.g., use of diverse methodologies in performing sensitivity tests).[14]

Brown (2003) shows that articles more heavily downloaded as working papers when posted to http://www.ssrn.com generate relatively more citations so I include a dummy variable for articles that Brown found to be (coded 1) or not found to be (coded 0) heavily downloaded as working papers.[15] I expect this variable to have a similar effect to the acknowledgment variables because, similar to them, it measures a paper's exposure.

I include two journal article dummies in case some journals are more highly cited than others, but I offer no priors regarding their expected signs. Articles published earlier have more time to accumulate citations so I expect articles published in 2000 (2002) to have more (fewer) citations.[16] My model's baseline is the number of citations to articles published in *Journal of Accounting Research* in 2002.

Results

Table 7, Panel A, provides summary statistics of the dependent variable, citations (*CITATIONS*), the three acknowledgments variables, and seven other variables for all journals combined and for each journal separately. Table 7, Panel B, is a correlation matrix of citations and the 10 explanatory variables. Pearson (Spearman) correlations are above (below) the diagonal. I use raw data in the multiple regression analyses so I emphasize the Pearson correlations.

Summary Statistics

Citations range from 0 to 26, with a mean of 1.96 and a median of 1.[17] Nearly half (119/256) of all articles published in three premier accounting journals were never cited according to the Social Science Citation Index as of May 31, 2003, the day I obtained citation information from this data source.[18] A Kruskal-Wallis test rejects the null hypothesis that the number of citations to the typical paper published in the three journals is identical. (Kruskal-Wallis statistic = 12.931; p = 0.0016). Two-sample Wilcoxon Rank Sums tests reveal that the typical article published in *JAE* or *TAR* is cited significantly more often than one published in *JAR* ($p < 0.01$ for both), but there is no significant difference in citations for the typical article published in *JAE* versus *TAR*.

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[14] I did not include this control variable in the editor's accept versus reject decision to minimize the extent of my request to Kate Flynn Connolly, editorial assistant of *TAR*.

[15] Brown (2003) defined a paper as heavily downloaded if it was in the top 500 of downloaded papers by the ssrn's Accounting Research Network. At the time of his study, the least often downloaded paper was downloaded 204 times. As Brown only obtained data for papers published in 2000 and 2001, I updated the information in his data set by coding papers as 1 if they were posted to ssrn.com, downloaded at least 204 times (0 otherwise), and published in 2002.

[16] I added two dummy variables rather than a "years since publication" variable because cumulative citations increase at a decreasing rate (Garfield 1979). Generally articles are cited most highly when they first come out.

[17] I do not discuss acknowledgments to institutions, conferences, and individuals in this section, having already discussed them in Section IV.

Page length ranges from 7 to 127 with a mean of 26.18 and a median of 24. A Kruskal-Wallis test rejects the null hypothesis that the page length of the typical paper published in the journals is identical (Kruskal-Wallis statistic equals 24.294; p = 0.0001). Two-sample Wilcoxon Rank Sums tests reveal that the typical article published in *Journal of Accounting and Economics* has more pages than the typical article published in *Journal of Accounting Research* or *The Accounting Review* ($p < 0.0001$ for both), but there is no significant difference in length of articles published in *JAR* and *TAR*.[19]

The number of authors ranges from one to four, with a mean of 2.19 and a median of 2. The number of authors is similar across journals, namely, 2.19, 2.28 and 2.07 in *JAE*, *JAR*, and *TAR*, respectively. A Kruskal-Wallis test fails to reject the null hypotheses that the number of authors of the typical article published in the three journals is identical (Kruskal-Wallis statistic = 3.262; p = 0.1958).

The 0/1 dummy variable, *SSRN*, has a mean of 0.34, and a median of 0. A Kruskal-Wallis test fails to reject the null hypotheses that the typical article published in each journal is identical with respect to the probability that its working paper version was highly downloaded from the SSRN (Kruskal-Wallis statistic = 2.208; p = 0.3315).

Journal of Accounting and Economics publishes only 20 percent of the total number of papers. It is evident that *JAE* employs a strategy of publishing fewer but much lengthier articles than do the other two journals. An increasing number of articles were published over time: 24 percent of the total in 2000, 34 percent in 2001, and 42 percent in 2002.

Correlations

Panel B of Table 7 shows that citations are correlated positively with the number of institutions acknowledged, heavily downloaded by ssrn.com, page length, appearance in *Journal of Accounting and Economics*, and publication before 2002.[20] Citation is correlated negatively with the number of co-authors, and it is unrelated to the number of conferences and individuals acknowledged, and to publication in *TAR*. Regarding correlations among the independent variables, the number of institutions acknowledged is correlated positively with the number of individuals and conferences acknowledged and publication in the year

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[18] In contrast, only three articles were cited over 10 times: two were published in *Journal of Accounting and Economics* (Ball et al. 2000, 26 cites; Kothari 2001, 13 cites), and one in *Journal of Accounting Research* (Brown 2001, 12 cites).

[19] It is conceivable that *JAE*'s lengthier papers are due to its publishing relatively fewer words on a page *vis-à-vis* both of the other journals. To examine this, my assistant, Nan Liu, performed a word count of one page per year per journal (nine pages in all). The average number of words for *JAE*, *JAR*, and *TAR* is 444.3, 403.3, and 514, respectively, suggesting that *JAE*'s lengthier papers are not due to its publishing relatively fewer words on a page *vis-à-vis* both of the other journals.

[20] All correlations discussed in this subsection use Pearson correlations and are significant at the 10 percent level or better, two-tailed test. With the exception of the number of institutions acknowledged, the results are also significant using Spearman correlations. To see if the longer page length result for *JAE* is an artifact of its 2001 conference issue consisting of review articles, I repeated the analysis twice, first by omitting 2001 for all journals, second by omitting all conference papers for all journals. The typical article published in *JAE* continues to be significantly longer than articles published in the other two premier accounting journals.

TABLE 7
Summary Statistics and Correlation Matrix for Variables Used in the Citation Analysis

Panel A: Summary Statistics

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
All Three Journals					
CITATIONS	1.96	3.09	1	0	26
INSTITUTIONS	4.63	3.79	4	0	20
CONFERENCES	1.25	1.31	1	0	8
INDIVIDUALS	8.54	6.49	7	0	31
PAGE	26.18	12.60	24	7	127
AUTHORS	2.19	0.86	2	1	4
SSRN	0.34	0.48	0	0	1
DJAE	0.21	0.41	0	0	1
DTAR	0.37	0.48	0	0	1
D2000	0.24	0.43	0	0	1
D2001	0.33	0.47	0	0	1
JAE					
CITATIONS	3.42	4.74	1	0	26
INSTITUTIONS	4.00	3.95	3	0	16
CONFERENCES	1.28	1.65	1	0	8
INDIVIDUALS	8.85	6.30	7	0	27
PAGE	35.83	21.98	28	14	127
AUTHORS	2.19	0.86	2	1	4
SSRN	0.36	0.48	0	0	1
D2000	0.34	0.47	0	0	1
D2001	0.40	0.49	0	0	1
JAR					
CITATIONS	1.26	2.27	0	0	12
INSTITUTIONS	4.83	3.72	4	0	15
CONFERENCES	1.29	1.31	1	0	6
INDIVIDUALS	7.96	5.95	7	0	30
PAGE	24.20	7.44	24	7	42
AUTHORS	2.28	0.86	2	1	4
SSRN	0.39	0.49	0	0	1
D2000	0.23	0.42	0	0	1
D2001	0.32	0.47	0	0	1

(*continued on next page*)

TABLE 7 (continued)

TAR					
CITATIONS	1.95	2.42	1	0	10
INSTITUTIONS	4.77	3.78	4	0	20
CONFERENCES	1.18	1.08	1	0	5
INDIVIDUALS	9.02	7.18	7	0	31
PAGE	23.03	5.74	23	10	37
AUTHORS	2.07	0.86	2	1	4
SSRN	0.29	0.45	0	0	1
D2000	0.20	0.40	0	0	1
D2001	0.31	0.46	0	0	1

Panel B: Correlation Matrix

	CITATIONS	*INSTITUTIONS*	*CONFERENCES*	*INDIVIDUALS*	*PAGE*	*AUTHORS*	*SSRN*	*DJAE*	*DTAR*	*D2000*	*D2001*
CITATIONS	1.000	0.190***	0.063	0.055	0.477***	−0.109*	0.221***	0.242***	−0.002	0.243***	0.136**
INSTITUTIONS	0.096	1.000	0.106*	0.229***	−0.044	−0.040	0.085	−0.086	0.027	0.142**	−0.074
CONFERENCES	−0.029	0.107	1.000	0.183***	0.018	0.303***	0.151**	0.013	−0.040	0.026	−0.078
INDIVIDUALS	−0.062	0.245***	0.174***	1.000	0.057	−0.099	−0.004	0.025	0.057	0.020	−0.014
PAGE	0.205***	0.071	0.127**	0.066	1.000	−0.074	0.245***	0.392**	−0.191***	−0.053	0.076
AUTHORS	−0.109*	−0.036	0.301***	−0.116*	0.032	1.000	0.129**	0.001	−0.100	−0.058	−0.038
SSRN	0.195***	0.061	0.109	0.025	0.252***	0.135**	1.000	0.016	−0.091	0.001	−0.178***
DJAE	0.154**	−0.108*	−0.039	0.033	0.300***	0.007	0.015	1.000	−0.389**	0.099	0.070
DTAR	0.083	0.030	−0.002	0.022	−0.176**	−0.113	−0.091	−0.389***	1.000	−0.065	−0.038
D2000	0.267***	0.118*	0.012	0.025	0.003	−0.058	0.001	0.099	−0.065	1.000	−0.394***
D2001	0.136**	−0.040	−0.088	−0.043	−0.144**	−0.036	−0.178***	0.070	−0.038	−0.394***	1.000

*, **, *** indicate significance at levels of 10%, 5% and 1%, respectively (two-tailed tests).

Pearson correlation coefficients are shown in upper triangle; and Spearman coefficients are shown in lower triangle.

CITATIONS = cumulative citations to each of the 256 articles published in *The Accounting Review*, *Journal of Accounting Research*, or *Journal of Accounting and Economics* between 2000 and 2002. (Source: Social Science Citation Index accessed on May 31, 2003);
INSTITUTIONS = number of institutions acknowledged;
CONFERENCES = number of conferences acknowledged;
INDIVIDUALS = number of individuals acknowledged;
PAGE = page length of article;
AUTHORS = number of authors;
SSRN = a dummy variable equal to 1 if the working paper was downloaded from ssrn.com at least 204 times, 0 otherwise;
DJAE = 1 if published in *Journal of Accounting and Economics*, 0 otherwise;
DTAR = 1 if published in *The Accounting Review*, 0 otherwise;
D2000 = 1 if published in 2000, 0 otherwise; and
D2001 = 1 if published in 2001, 0 otherwise.

2000. The number of conferences acknowledged is correlated positively with the number of individuals acknowledged, the number of co-authors, and heavily downloaded by ssrn.com. Article length is correlated positively with heavily downloaded by ssrn.com and publication in *JAE* and negatively with publication in *TAR*.[21] The number of co-authors is correlated positively with heavily downloaded by ssrn.com. Heavily downloaded by ssrn.com is correlated negatively with publication in 2001. By construction, *DJAE* is correlated negatively with *DTAR* and *D2000* is correlated negatively with *D2001*.

Negative Binomial Regression Results

Pooled temporal, cross-sectional analysis. Table 8, Panel A, provides negative binomial regression results for data pooled across years and journals. I use this procedure in lieu of OLS because my dependent variable is non-negative counting data.[22] The model's pseudo R^2 is 11.02 percent. Consistent with the univariate results, citation increases as the number of institutions acknowledged increases ($p < 0.01$), but not as the number of conferences or individuals acknowledged increases.[23]

Consistent with the univariate results, citation is related positively to article length, heavily downloaded from ssrn.com, and length of time since publication ($p < 0.01$ for all). Unlike the univariate results, the *TAR* dummy variable shows that articles published in *The Accounting Review* are significantly more likely to be cited than articles published in *Journal of Accounting Research* ($p < 0.01$). Wald tests fail to reject the null hypotheses that citations to *TAR* articles differ from those to *JAE* articles or that citations to 2000 publications differ from those to 2001 publications.

Omitting conference papers. The Panel A results may be influenced by inclusion of conference papers, which relative to nonconference papers, are more likely to be methodological, surveys, or focus on hot topics, thus cited more often (Brown and Gardner 1985). To alleviate this problem, I repeat the Panel A analysis omitting the 29 conference papers. The results, reported in Panel B, are virtually identical to those shown in Panel A, suggesting that including conference papers does not impact my results.

Analysis by journal. Table 8, Panel C, provides results for each journal. *INSTITUTIONS* has its expected positive coefficient and it is significant in all three regressions ($p < 0.05$ for all). In contrast, neither of the other two acknowledgment variables is significant with its expected positive sign in any of the three regressions. *PAGE* and *SSRN* have their expected positive coefficients and are significant in all three regressions (*PAGE*: $p < 0.01$ for *JAE* and $p < 0.10$ for *JAR* and *TAR*; *SSRN*: $p < 0.10$ for *JAE*, $p < 0.01$ for *JAR*, and $p < 0.10$ for *TAR*). *D2000* and *D2001* have their expected positive coefficients and are significant for all three regressions (*D2000*: $p < 0.05$ for *JAE* and $p < 0.01$ for *JAR* and *TAR*; *D2001*: $p < 0.01$ for *JAR* and *TAR*, $p < 0.10$ for *JAE*).

VI. SENSITIVITY ANALYSIS

My primary result is that papers presented at more workshops are more likely to be invited back after an initial submission (to *TAR*) and, when published in a premier accounting journal, to be cited more often. An alternative interpretation of my findings is that well-regarded people from well-known universities are more likely to get favorable reviews and

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[21] Aside from the correlations among sets of dummy variables, the correlation between article length and publication in *Journal of Accounting and Economics* is the largest of any of the other correlations.

[22] I obtain similar untabulated results using OLS.

[23] I obtained similar results by running the regressions using only one of the acknowledgment variables at a time in the model. Each variable has its expected sign, but only the institution variable is significant.

TABLE 8
Citation Analysis

Panel A: All Papers

Model: CITATIONS = b0+b1**INSTITUTIONS*+b2**CONFERENCES*+b3**INDIVIDUALS*+b4**PAGE*+b5**AUTHORS*+b6**SSRN*+b7**DJAE* +b8**DTAR*+b9**D2000*+b10**D2001*

Variable	Expected Sign	Coefficient	z-statistic
Intercept	?	−1.622***	−4.21
INSTITUTIONS	+	0.059***	2.77
CONFERENCES	+	0.027	0.41
INDIVIDUALS	+	−0.013	−1.05
PAGE	+	0.030***	4.02
AUTHORS	+	−0.152	−1.44
SSRN	+	0.653***	3.64
DJAE	?	0.287	1.21
DTAR	?	0.593***	3.14
D2000	+	1.443***	6.86
D2001	+	1.152***	5.69

n = 256, Pseudo R^2 = 0.1102

(*continued on next page*)

TABLE 8 (continued)

Panel B: Without Conference Papers

Model: CITATIONS = b0+b1**INSTITUTIONS*+b2**CONFERENCES*+b3**INDIVIDUALS*+b4**PAGE*+b5**AUTHORS*+b6**SSRN*+b7**DJAE*
+b8**DTAR*+b9**D2000*+b10**D2001*

Intercept	?	−2.258***	−5.02
INSTITUTIONS	+	0.052**	2.29
CONFERENCES	+	0.004	0.06
INDIVIDUALS	+	−0.005	−0.40
PAGE	+	0.057***	4.23
AUTHORS	+	−0.182	−1.70
SSRN	+	0.668***	3.60
DJAE	?	0.024	0.10
DTAR	?	0.647***	3.40
D2000	+	1.636***	7.53
D2001	+	1.207***	5.60

n = 227, Pseudo R^2 = 0.1191

(*continued on next page*)

TABLE 8 (continued)

Panel C: Analysis by Journal

Model: CITATIONS = b0+b1**INSTITUTIONS*+b2**CONFERENCES*+b3**INDIVIDUALS*+b4**PAGE*+b5**AUTHORS*+b6**SSRN*+b7**D2000* +b8**D2001*

Variable	Expected Signs	*JAE* Coefficient	*JAE* z-statistic	*JAR* Coefficient	*JAR* z-statistic	*TAR* Coefficient	*TAR* z-statistic
Intercept	?	−0.929	−1.25	−2.693***	−2.83	−1.121**	−2.07
INSTITUTIONS	+	0.098**	1.87	0.107**	2.17	0.062**	2.30
CONFERENCES	+	−0.062	−0.48	0.167	1.25	−0.169	−1.43
INDIVIDUALS	+	−0.049	−1.86	−0.024	−0.79	0.017	1.21
PAGE	+	0.034***	3.57	0.034*	1.47	0.032*	1.55
AUTHORS	+	−0.069	−0.30	0.025	0.12	−0.182	−1.17
SSRN	+	0.548*	1.61	1.024***	2.95	0.384*	1.54
D2000	+	0.824**	1.67	1.439***	3.52	1.675***	6.19
D2001	+	0.665*	1.43	1.199***	3.03	1.253***	4.63
		n =53, Pseudo R^2 = 0.1350		n = 109, Pseudo R^2 = 0.0882		n = 94, Pseudo R^2 = 0.1363	

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*, **, *** Indicate significance (one-tailed tests) at the level of 10%, 5%, 1%, respectively for all variables except for *DJAE* and *DTAR* (two-tailed tests).

Pooled temporal cross-sectional negative binomial regression of cumulative citations to 256 articles published in *The Accounting Review*, *Journal of Accounting Research*, or *Journal of Accounting and Economics* between 2000 and 2002 on three acknowledgments variables, *INSTITUTIONS*, *CONFERENCES*, and *INDIVIDUALS*, and seven other variables, *PAGE*, *AUTHORS*, *SSRN*, *DJAE*, *DTAR*, *D2000*, and *D2001*.

CITATIONS = cumulative citations to each of the 256 articles. (Source: Social Science Citation Index information available on May 31, 2003);
INSTITUTIONS,
CONFERENCES,
and INDIVIDUALS = the number of institutions, conferences and individuals acknowledged, respectively;
PAGE = page length of article;
AUTHORS = number of authors;
SSRN = a dummy variable equal to 1 if the working paper was downloaded from ssrn.com at least 204 times, 0 otherwise;
DJAE = 1 if published in *Journal of Accounting and Economics*, 0 otherwise;
DTAR = 1 if published in *The Accounting Review*, 0 otherwise;
D2000 = 1 if published in 2000, 0 otherwise; and
D2001 = 1 if published in.2001, 0 otherwise.

to be highly cited, and that the workshop presentation adds nothing incremental to a paper's publication probability or to its influence. In an attempt to rule out this alternative explanation, I add two quality variables.

My first quality variable (*QUAL1*) is based on the research quality of authors' institutions. My data source is Trieschmann et al. (2000) who assessed research quality of business faculty by discipline based on pages published in the discipline's premier journals during 1986–1998. For accounting, Trieschmann et al. (2000) selected *JAE, JAR,* and *TAR*. They ranked accounting programs in descending order from 1 (highest-ranked institution) to 171 (lowest-ranked institution). I coded the quality of submissions to *TAR* and the articles published in *JAE, JAR,* and *TAR* during 2000–02 by giving papers an average rank based on the authors' institutions. For example, if there are three co-authors, and two are at universities with accounting programs that ranked 102 and 88, I took the average of the two accounting program ranks (95) and I assigned it to the paper. If none of the authors is at an institution with a ranked accounting program, I omit the paper from consideration. I then took the inverse of the rank to put it on the same footing with my second quality variable so that ranks increase when their magnitudes increase.

My second quality variable (*QUAL2*) is based on the number of articles the authors published in *JAE, JAR,* or *TAR* in the three years prior to submittal to *TAR* (*DECISION* analysis) or publication in *JAE, JAR,* and *TAR* (*CITATION* analysis). I use the three-year period 1999–2001 for both submittals to *TAR* and publications in the three accounting journals in 2002. Similarly, I use the three-year period 1997–1999 (1998–2000) for articles published in the three accounting journals in 2000 (2001). I use a similar coding procedure to that for *QUAL1*. For example, if a paper published in 2002 has three co-authors, who respectively published 0, 2, and 2 articles in *JAE, JAR,* and *TAR* in 1999–2001, I coded the second quality measure as 1.33.

Panel A of Table 9 expands the *TAR* decision analysis to include *QUAL1* and *QUAL2*. I lose 99 working papers so my analysis is based on 206 initial submissions. As expected, both *QUAL1* and *QUAL2* are positive and nearly significant ($p = 0.11$ for both), providing weak evidence that authors from better known universities or who have published recently in the premier accounting journals are more likely to get a favorable response from the *TAR* editor on the first round. More importantly, *INSTITUTIONS* is still positive and significant ($p < 0.01$), revealing that presenting at more workshops increases one's success probability after controlling for the research quality of the individual's employer and that of the individual.

Panel B of Table 9 expands the citation analysis to include these same two quality variables. I lose 17 publications so my analysis is based on 239 articles. Both quality measures are insignificant, but the rest of the results are virtually identical to those shown in Panel A of Table 8. Most importantly, *INSTITUTIONS* is the only significant acknowledgments variable with its expected positive coefficient ($p < 0.01$). Regarding the control variables, the number of citations is positively related to article length, heavily downloaded from ssrn.com, published in *TAR*, and published in either 2000 or 2001 ($p < 0.01$ for all control variables).[24]

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[24] In order to maximize sample size, I also used a procedure where I retained all papers, assigning papers with no authors employed at institutions ranked by Trieschmann et al. (2000) ranks of 1/172 (the inverse of one rank below Trieschmann et al.'s lowest rank). Both quality variables are positive and significant ($p < 0.05$) when I examined initial *TAR* submissions, and both quality variables remain insignificant for the citation analysis. *INSTITUTIONS* is positive and significant in both the *DECISION* and *CITATIONS* analyses.

TABLE 9
Extended Analyses of *TAR* Submittals and Citations

Panel A: *TAR* Submittals

Model: $DECISION = b0+b1*INSTITUTIONS+b2*CONFERENCES+b3*INDIVIDUALS +b4*AUTHORS+b5*QUAL1+b6*QUAL2$

Variable	Expected Sign	Coefficient	z-statistic	Odds Ratio
Intercept	?	−1.291***	−2.56	
INSTITUTIONS	+	0.215***	3.41	1.239
CONFERENCES	+	0.029	0.18	1.030
INDIVIDUALS	+	−0.039	−1.01	0.962
AUTHORS	+	−0.150	−0.74	0.861
QUAL1	+	1.511*	1.62	4.529
QUAL2	+	0.333*	1.56	1.395

n = 206, Pseudo R^2 = 0.0987, Log likelihood = −112.81

Panel B: Citation Analysis

Model: $CITATIONS = b0+b1*INSTITUTIONS+b2*CONFERENCES+b3*INDIVIDUALS +b4*PAGE+b5*AUTHORS+b6*SSRN+b7*DJAE+b8*DTAR+b9*D2000 +b10*D2001+b11*QUAL1+b12*QUAL2$

Variable	Expected Sign	Coefficient	z-statistic
Intercept	?	−1.444***	−3.59
INSTITUTIONS	+	0.050**	2.22
CONFERENCES	+	0.042	0.60
INDIVIDUALS	+	−0.015	−1.21
PAGE	+	0.033***	3.65
AUTHORS	+	−0.242	−2.17
SSRN	+	0.678***	3.65
DJAE	?	0.313	1.23
DTAR	?	0.590***	3.02
D2000	+	1.461***	6.65
D2001	+	1.109***	5.29
QUAL1	+	−0.722	−1.24
QUAL2	+	0.084	0.96

n = 239, Pseudo R^2 = 0.1133

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*, **, *** indicate significance (one-tailed tests) at the level of 10%, 5%, 1%, respectively, for all variables except for *DJAE* and *DTAR* (two-tailed tests).

All variables are defined in Tables 2 and 8 except for *QUAL1* and *QUAL2*. The quality of submissions to *TAR* and the articles published in *JAE, JAR,* and *TAR* during 2000–2002 are coded using an average rank (*QUAL1*) based on the authors' institutions. For example, if there are three coauthors, and two are at universities with accounting programs that ranked 102 and 88, the average of the two accounting program ranks (95) was assigned to the paper. If none of the authors was at an institution with a ranked accounting program, the paper is omitted. The inverse of the rank was then taken so that *QUAL1* ranks increase with their magnitudes. *QUAL2* is based on the number of articles the authors published in *JAE, JAR,* or *TAR* in the three years prior to submittal to *TAR* (*DECISION* analysis) or publication in *JAE, JAR,* and *TAR* (*CITATIONS* analysis). If two coauthors published 3 and 0 articles in the three prior years, *QUAL2* was given a rank of 1.5.

In sum, results for both analyses are robust to including quality measures of both the authors' institutions and of the authors themselves. My fundamental result that presenting at workshops is a valuable exercise for authors seeking to increase their publication success or influence remains intact.

VII. SUMMARY

Editors exhort authors to circulate their working papers before submitting them for possible publication (Zimmerman 1989; Green et al. 2002). Journals seek to publish influential papers, and obtaining feedback from one's peers is said to increase a paper's influence (Zimmerman 1989). In spite of the importance and intuitive appeal of this advice, there is no systematic evidence that more widely circulated papers are more likely to be published, and, once published, are more likely to stimulate additional research.

I directly examine these two interrelated issues, and I obtain similar results for both. I examine acknowledgments to 305 submissions to *The Accounting Review* from June 2002–May 2003, and show that *TAR* editors are more likely to invite manuscripts presented at more workshops to be revised and resubmitted to the *Journal*.[25] I examine acknowledgments to all 256 articles published between 2000 and 2002 in *The Accounting Review*, *Journal of Accounting Research*, and *Journal of Accounting and Economics*, and show that these papers are cited more often (my proxy for influence) if they are presented at more workshops.[26]

My findings are of interest to researchers, editors, and administrators. My evidence suggests that researchers should present their working papers at workshops, even in-house ones or those at nearby institutions. Editors should advise researchers to circulate their manuscripts before submitting them for possible publication. Knowledge that workshops add considerable value to the research process can help administrators decide how best to allocate their scarce resources.[27]

I recognize that my results are subject to a potential validity threat that faculty from better-known universities and those with a track record of publishing recently in premier accounting journals are more likely to be invited to workshops, implying that my results may not indicate that workshops per se add value to the research process. I mitigate this concern by controlling for the research quality of the authors' institution and the research quality of the authors. My principal findings that workshop presentations increase the probability of getting a favorable initial review and, once published, an article's influence remain once I consider this potential validity threat.

I do not definitively show that comments raised by workshop participants improve papers. Other important (related) factors may be at work. Authors invited to present their research at other universities may focus their attention more intensely, leading them to improve their manuscripts. I cannot rule out the possibility that it is the very act of preparing for a workshop that causes authors to improve their manuscripts rather than any feedback they receive during workshops. However, this fine distinction is unimportant for my main message. Presenting one's research at workshops facilitates the probability of a paper's publication and its likely influence, regardless of why workshop presentations facilitate these goals.

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[25] I find some (weak) evidence that the number of individuals who are acknowledged matters and (weaker evidence) that the number of conferences acknowledged matters but my results are not robust to the various models I consider.

[26] I also find that several control factors are positively related to citation: article length, heavily downloaded from ssrn.com, publication in *TAR*, or publication in 2000 or 2001 (rather than 2002).

[27] Workshop presentations often follow a *quid pro quo* (i.e., faculty at University A who present at University B invite faculty at University B to present at University A).

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 85–112

What Determines Residual Income?

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ABSTRACT: This paper investigates the determinants of residual income scaled by book value of equity, i.e., abnormal return on equity (ROE), by analyzing the impact of value-creation (economic rents) and value-recording (conservative accounting) processes on abnormal ROE. I rely on economic theories to characterize economic rents and develop an empirical measure—the conservative accounting factor—to capture the effect of conservative accounting. As expected, industry abnormal ROE increases with industry concentration, industry-level barriers to entry, and industry conservative accounting factors. Also as expected, the difference between firm and industry abnormal ROE increases with market share, firm size, firm-level barriers to entry, and firm conservative accounting factors. Integrating these determinants into the residual income valuation model significantly increases its explanatory power for the variation in the market-to-book ratio.

Keywords: *equity valuation; the residual income valuation model; economic rents; conservative accounting.*

Data Availability: *The data used in this study are available from sources identified in the text.*

JEL Classification: *D4; G12; M4.*

I. INTRODUCTION

The residual income valuation model (RIM) provides a parsimonious framework linking accounting information to firm value. It has been widely used to estimate firm value and the cost of equity.[1] The RIM model states that firm value is the sum of book value and the present value of expected future residual income. Thus, forecasting future residual income is critical to RIM implementations. Prior research often relies on

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[1] See Lee (1999) and Lo and Lys (2000) for reviews of RIM-based studies.

This paper is based on my dissertation finished at the University of Wisconsin–Madison. I thank two anonymous referees, Holly Ashbaugh, Sid Balachandran, Joy Begley, Walt Blacconiere, Bob Bowen, Larry Brown, David Burgstahler, Sandra Chamberlain, Werner De Bondt, Peter Easton, Richard Frankel, Bruce Hansen, Elizabeth Keating, Mark Kohlbeck, Per Olsson, Stephen Penman, Morton Pincus, Pervin Shroff, Shyam Sunder, Jim Wahlen, John Wild, Peter Wilson, workshop participants at the following universities: Boston College, Columbia, Cornell, Georgia State, Indiana, Iowa, Michigan, Minnesota, MIT, Northwestern, University of California, Berkeley, Washington (Seattle), Washington (St. Louis), Wisconsin–Madison, and Yale, conference participants at the 2001 AAA Annual Meeting in Atlanta, the 2001 Summer Symposium on Accounting Research at Hong Kong University of Science & Technology, and the 2001 Accounting Symposium at London Business School, and especially Xia Chen, S. P. Kothari, Charles M. C. Lee, Terry Shevlin, and Terry Warfield (adviser), for valuable comments on earlier versions of this paper.

Editor's note: This paper was accepted by Patricia Dechow, Editor.

Submitted January 2003
Accepted May 2004

the linear information dynamics proposed by Ohlson (1995) and Feltham and Ohlson (1995) for this purpose. However, Dechow et al. (1999) and Myers (1999) find that these information dynamics combined with the RIM fail to capture firm value effectively. This failure calls for a better understanding of the determinants of residual income (Beaver 1999).

To this end, this paper first investigates the impact of value-creation (economic rents) and value-recording (conservative accounting) processes on residual income scaled by book value of equity, i.e., abnormal return on equity (ROE). It then examines whether integrating economic and accounting determinants of abnormal ROE into the RIM can improve its ability to explain firm value.

This paper hypothesizes that abnormal ROE increases with economic rent proxies and conservative accounting factors. It relies on theories of competition to identify proxies for economic rents. These proxies measure the extent of imperfect competition, under which firms can price products above marginal costs and earn positive abnormal ROE. Conservative accounting, such as expensing investments with future benefits, can cause *recorded* earnings and book value of equity to differ from economic measures and lead to nonzero abnormal ROE. To capture the impact of conservatism on abnormal ROE, I develop an empirical measure, the conservative accounting factor. This factor takes into consideration the impact of conservatism on both net income and book value of equity.

This paper assumes that abnormal ROE follows a first-order autoregressive (AR(1)) process and allows the AR(1) parameter (i.e., persistence) to vary with economic rent proxies and conservative accounting factors. Because industry abnormal ROE is likely to have different persistence from firm differential abnormal ROE (the difference between firm and industry abnormal ROE), the empirical analyses are conducted separately at the industry level and the firm level. The industry-level analysis suggests that the persistence of industry abnormal ROE increases with industry concentration, industry-level barriers to entry, and industry conservative accounting factors. The firm-level analysis suggests that the persistence of firm differential abnormal ROE increases with market share, firm size, firm-level barriers to entry, and firm conservative accounting factors.

Like the persistence of abnormal ROE, its permanent level (i.e., the unconditional mean) might also vary systematically across industries and firms, especially over finite horizons analyzed in empirical studies (Mueller 1977; Zhang 2000). The abnormal ROE analyses are then extended to explain the permanent level of abnormal ROE. The results suggest that the permanent level increases with economic rent proxies and conservative accounting factors as well.

Last, this paper conducts market-to-book ratio analyses to investigate the extent to which economic and accounting determinants of abnormal ROE improve RIM implementations. Integrating these determinants into a model with current abnormal ROE and other factors examined in prior research increases the explanatory power (i.e., the adjusted R^2) by 40 percent and 33 percent for industry and firm market-to-book ratio, respectively. Additional analyses indicate that these determinants have incremental explanatory power over models analyzed in prior studies (Fairfield et al. 1996; Bhojraj and Lee 2002).

This study contributes to the valuation literature in three ways. First, it provides a framework for forecasting future residual income and improves our understanding of the link between current and future accounting information. It decomposes abnormal ROE into an economic rent component and a conservative accounting component, and finds that both components significantly improve forecasts of abnormal ROE and the ability of the RIM to explain firm value.[2] Such evidence is important for both valuation studies and studies that rely on the RIM valuation framework, such as value relevance studies, by suggesting a list of economic and accounting variables that can capture the cross-sectional variation in firm value.

Second, it provides insights into the impact of economic rents on abnormal ROE. Extending prior research, including Lev (1983) and Baginski et al. (1999), this paper studies both the persistence of abnormal ROE and its permanent level. This paper also uses a more comprehensive set of economic rent proxies. This is important given that different economic rent proxies likely correlate with each other (Porter 1980). The analyses suggest that industry concentration, firm size, market share, and barriers to entry all positively affect future abnormal ROE.

Third, while prior research recognizes the impact of conservatism on accounting numbers (e.g., Zhang 2000), there is limited research on how to empirically capture such impact. This paper develops an empirical measure to capture the impact of conservatism on abnormal ROE for individual firms. This measure reflects the notion that the conservative accounting effect is contingent on the growth of investments recorded conservatively: the effect is negative when the growth is high and positive when the growth is low. Empirical results indicate that this measure helps *forecast future* abnormal ROE of *individual* firms and industries. Thus, this paper extends prior empirical studies on conservative accounting, such as Lev et al. (1999) and Monahan (1999), which use a *portfolio* approach to demonstrate the effect of capitalizing R&D expenditures on *contemporaneous* performance measures and returns-earnings associations, among other things.

The remainder of the paper is organized as follows. Section II analyzes economic and accounting factors that affect abnormal ROE and presents hypotheses. Section III describes sample selection and variable measurement. Section IV reports the abnormal ROE analyses and Section V reports the market-to-book ratio analyses. Section VI concludes.

II. HYPOTHESIS DEVELOPMENT

Assuming that accounting satisfies the clean surplus relation (the change in book value of equity equals net income minus net dividends) and that the intrinsic value of equity equals the present value of future net dividends, one can represent the intrinsic value of equity (V_t) by the residual income valuation model (RIM):

$$V_t = BV_t + E_t\left[\sum_{\tau=1}^{\infty} \frac{X^a_{t+\tau}}{(1+r)^\tau}\right], \tag{1}$$

where BV_t is book value of equity, $E_t(.)$ is the expectation at time t, X^a_t is residual income, and r is the cost of equity, which is used to discount all future payoffs to equity holders. Residual income denotes the difference between net income (X_t) and the required return from beginning-of-period book value of equity, i.e., $X^a_t = X_t - rBV_{t-1}$. Basically, the RIM model states that firm value is the sum of book value and the present value of expected future residual income.

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[2] Prior research generally focuses either on economic rents or on conservative accounting. One exception is a concurrent study, Jansen (2002), which also investigates both effects. Compared to Jansen (2002), this paper uses a more comprehensive set of economic rent proxies and allows both the persistence and the permanent level of firm performance to vary with economic rents and conservative accounting factors, instead of attributing the permanent level to conservative accounting effects and the persistence to economic rents, as done in Jansen (2002).

Accordingly, forecasting residual income is critical to implementations of the RIM model. To improve the forecasts, this paper investigates the determinants of residual income. Since analysis of residual income is potentially subject to scale problems (Brown et al. 1999), this paper focuses on abnormal ROE (ROE_t^a), residual income scaled by book value of equity, or the difference between ROE and the cost of equity. In terms of abnormal ROE, the RIM model can be rewritten as:

$$V_t = BV_t + E_t\left[\sum_{\tau=1}^{\infty} \frac{ROE_{t+\tau}^a \cdot BV_{t+\tau-1}}{(1+r)^\tau}\right]. \tag{1'}$$

The RIM model holds under both unbiased accounting and conservative accounting. Under unbiased accounting, a firm's ROE equals its cost of equity if the firm operates under perfect competition. However, if the competition is imperfect, the firm can charge prices higher than its costs; accordingly, economic rents arise and abnormal ROE is no longer zero.

Under conservative accounting, accounting measures deviate from economic measures. As a result, accounting ROE is different from economic rate of return, and a firm's abnormal ROE can be nonzero even if the firm operates under perfect competition. That is, conservative accounting is also an important determinant of abnormal ROE (Ohlson 1995; Feltham and Ohlson 1995, 1996; Zhang 2000). Below, I first decompose abnormal ROE under conservative accounting into a conservative accounting component and an economic rent component, and then discuss these two components in detail.

Economic Rents, Conservative Accounting, and Abnormal ROE

Suppose that the clean surplus relations under unbiased and conservative accounting are:

$$BV_t' = BV_{t-1}' + X_t' - d_t,$$
$$BV_t = BV_{t-1} + X_t - d_t,$$

where d is net dividends, which are assumed to be the same under the two accounting systems, i.e., net dividends are not affected by accounting policies. Accounting numbers under unbiased accounting are denoted by " ' ".

Subtracting the second equation from the first one yields:

$$BV_t' - BV_t = BV_{t-1}' - BV_{t-1} + X_t' - X_t.$$

The difference in book value of equity between unbiased and conservative accounting is defined as the estimated reserve (*ER*), as in Penman and Zhang (2002). The estimated reserve can be interpreted as a measure of how conservative an accounting system is. As in Feltham and Ohlson (1996) and Gjesdal (1999), conservative accounting is defined such that the carrying value assigned to investments yields an expected accounting rate of return greater than the internal rate of return. Thus, the estimated reserve is positive under conservative accounting and the higher the estimated reserve, the more conservative the accounting system.

In terms of the estimated reserve, the above equation can be written as:

$$X_t' - X_t = ER_t - ER_{t-1}. \tag{2}$$

That is, the difference in net income under the two accounting systems is the change in the estimated reserve. Net income under conservative accounting is lower than that under unbiased accounting if the estimated reserve increases, and vice versa.

Dividing both sides of Equation (2) by beginning-of-period book value of equity under conservative accounting and after some algebra, one can obtain the relation between conservative accounting, economic rents, and abnormal ROE:

$$\begin{aligned} ROE_t^a &= \frac{(1 + r)ER_{t-1} - ER_t}{BV_{t-1}} + ROE_t^{a'}\left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right) \\ &= CAF_t + ROE_t^{a'}\left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right). \end{aligned} \tag{3}$$

See Appendix A for the derivation. This equation suggests that abnormal ROE under conservative accounting consists of two components. The first component, referred to as the conservative accounting factor (*CAF*), captures the impact of conservatism on abnormal ROE. The second component captures the impact of economic rents—abnormal ROE under unbiased accounting.

Conservative Accounting Factor

Conservatism is "a prudent reaction to uncertainty to try to ensure that uncertainty and risks inherent in business situations are adequately considered (FASB 1980, 2)." One prime example of conservatism under U.S. accounting is the expensing of R&D expenditures. Because the benefits from R&D expenditures are uncertain, these investments are not recognized as assets and are required to be expensed.[3] Expensing an investment with future benefits has a negative impact on abnormal ROE in the investment period and a positive impact for the rest of its useful life. If the growth of investments is high, the negative impact of contemporaneous investments on current abnormal ROE dominates the positive impact of past investments, and if the growth is low, the positive impact dominates the negative impact. The quantitative impact of conservatism on abnormal ROE can be captured by the conservative accounting factor developed above (see Equation (3)):[4]

$$CAF_t = \frac{(1 + r)ER_{t-1} - ER_t}{BV_{t-1}} = \frac{(ER_{t-1} - ER_t) + rER_{t-1}}{BV_{t-1}}.$$

Basically, *CAF* is the inverse change in the estimated reserve (i.e., the net income effect) after adjusting for the opportunity cost of the beginning-of-period estimated reserve (i.e., the book value effect).[5]

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[3] An exception to this rule is that firms can capitalize R&D expenditures associated with computer software development incurred after the establishment of technological feasibility.

[4] Equation (3) suggests that conservative accounting also affects abnormal ROE through the lagged estimated reserve (the second term). Given that on average economic rents ($ROE_t^{a'}$) are zero due to competition, the lagged estimated reserve is not correlated with abnormal ROE in a cross-sectional setting; for simplicity, it is not considered in the empirical analyses. Explicitly controlling for the lagged estimated reserve does not affect the inferences.

[5] To see how the conservative accounting factor is contingent on growth, one can rewrite CAF_t as $(r - g_{ER,t})ER_{t-1}/BV_{t-1}$, where $g_{ER,t}$ $(=[ER_t - ER_{t-1}]/ER_{t-1})$ stands for the growth of the estimated reserve. Thus, a conservative accounting policy has a negative impact on abnormal ROE for firms with high growth in investments recorded conservatively and a positive impact for firms with low or no growth in those investments.

The above discussion and Equation (3) lead to the first hypothesis (in alternative form):

H1: Abnormal ROE increases with conservative accounting factors.

Economic Rents

Competition within an industry can drive prices down to marginal costs so that the net present value of an investment and industry abnormal ROE under unbiased accounting are zero. However, imperfect competition can lead to economic rents, and the less competitive an environment is, the higher economic rents are.

Neo-classical economic theories suggest that the level of competition and economic rents depend on industry structure, i.e., industry concentration and industry level barriers to entry. Concentration can yield economic rents because firms in a concentrated industry can collude and set prices above marginal costs so that they can have positive abnormal ROE. As predicted by oligopoly theories, the effectiveness of collusion increases with concentration (Strickland and Weiss 1976). Barriers to entry, on the other hand, can induce and sustain economic rents by reducing threats from outside competition. Product innovations (temporary monopoly power), product differentiation (buyer inertia and loyalty), capital intensity (minimum required capital), scarce resources, patents, and immobile management talents all could result in high barriers to entry (Eaton and Lipsey 1981; Mueller 1977).

These discussions lead to the second hypothesis (in alternative form):

H2: Abnormal ROE increases with industry concentration and industry-level barriers to entry.

If firms in an industry are not homogeneous as assumed in neo-classical economic theories, then firm characteristics, such as market share, firm size, or firm-level barriers to entry, can affect profitability as well (Brozen 1971; Martin 1983). Firms with large market share enjoy economic rents because large market share leads to economies of scale and increased bargaining power in an oligopoly. Similarly, large firms can enjoy economies of scale in both the product market and the financing market. Furthermore, Mueller (1986) argues that firm-level barriers to entry are more important than industry-level barriers to entry in protecting firms from outside competition.

These discussions lead to the last hypothesis (in alternative form):

H3: Abnormal ROE increases with market share, firm size, and firm-level barriers to entry.

One can express firm abnormal ROE ($ROE^a_{i,t}$) as the sum of industry abnormal ROE ($ROE^a_{j,t}$) and firm differential abnormal ROE ($DROE^a_{i,t}$):

$$ROE^a_{i,t} = ROE^a_{j,t} + DROE^a_{i,t},$$

where j stands for the industry to which firm i belongs. Because industry abnormal ROE varies with industry characteristics and firm differential abnormal ROE varies with firm characteristics, these two components might have different persistence.[6] Accordingly, this paper analyzes them separately. The industry-level analysis examines how industry characteristics affect industry abnormal ROE and the firm-level analysis examines how firm characteristics affect firm differential abnormal ROE.[7]

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[6] This is empirically confirmed based on 219 industries and 1,052 firms with at least 25 consecutive years of data on abnormal ROE. The difference in abnormal ROE persistence (estimated from AR(1) processes) between a firm and the industry to which it belongs has a wide range. For an industry with a persistence of 0.55 (the sample average), half of the firms in the industry have a persistence higher than 0.65 or lower than 0.33.

III. SAMPLE SELECTION AND VARIABLE MEASUREMENT

Sample Selection

All firm-year observations in the period 1976–1997 with available data on abnormal ROE and firm characteristics from the 1998 Compustat database are used in the abnormal ROE analyses. The sample period begins with 1976, when there are enough observations to estimate the predicted future industry abnormal ROE (which is used in the firm abnormal ROE analyses, and the estimation of which is described in Section IV). The sample period ends with 1997 due to the need for one-year-ahead abnormal ROE. Regulated firms, including financial institutions (SIC codes between 6000 and 6999) and utilities (SIC codes between 4900 and 4999), are excluded because their operations are markedly different from other firms.[8] Observations with book value of equity less than $1 million and those with abnormal ROE greater than 100 percent or less than −100 percent (2.2 percent of the original sample) are dropped to reduce the influence of extreme values. The final sample consists of 3,270 observations for the industry abnormal ROE analyses and 22,536 observations for the firm abnormal ROE analyses. The sample for the market-to-book ratio analyses is described in Section V.

Variable Measurement

Firm Abnormal ROE

Firm abnormal ROE is measured as the difference between ROE and the industry cost of equity, where ROE is measured as net income before extraordinary items available for common equity deflated by beginning-of-period book value of equity. The industry cost of equity is the sum of the annualized one-month T-bill yield and the industry equity premium. This latter term is estimated from the conditional three-factor model as studied in Fama and French (1997). This paper uses the industry cost of equity because it contains smaller measurement errors than the firm cost of equity (Fama and French 1997).

Firm Characteristics

Market share is measured as the ratio of a firm's sales to total industry sales. Firm size is measured as the natural logarithm of total assets. This paper uses three proxies for barriers to entry: R&D intensity (the ratio of R&D expenditures to sales) for product innovation, advertising intensity (the ratio of advertising expenditures to sales) for product differentiation, and capital intensity (the ratio of depreciation, depletion, and amortization expenses to sales) for minimum required capital. However, high capital intensity could also result in low abnormal ROE due to high capacity adjustment costs (Lev 1983). Thus, the direction of the impact of capital intensity is unclear.

Conservative accounting factors are calculated for R&D and advertising expenditures. The R&D reserve is the unamortized portion of R&D assets generated by current and past R&D expenditures if these expenditures were capitalized. Similarly for the advertising reserve. R&D assets are amortized using the coefficients reported in Lev and Sougiannis

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[7] Combining the industry and firm analyses together, while still allowing the two components to have different persistence, does not change the inferences but makes result presentations cumbersome.

[8] Although certain industry characteristics are used to explain industry performance, special features of regulated industries, such as regulations on the rate of return, still warrant separate analyses. See Nwaeze (2000) for a detailed discussion of electric utilities.

(1996). Advertising assets are amortized using an accelerated method (sum-of-year digits over two years), as in Penman and Zhang (2002).

Note that economic rents and conservative accounting effects might be related. For example, successful R&D investments can affect abnormal ROE through both economic rents and conservative accounting factors. These two effects are conceptually distinguishable though. While abnormal ROE due to economic rents increases with the level of R&D expenditures, abnormal ROE due to conservative accounting depends on both the level and the growth of R&D expenditures. These effects are empirically distinguishable if their empirical proxies, R&D intensity and the R&D conservative accounting factor, are not highly correlated. The correlation between these two variables is low (−0.05) in the sample.[9] Similar arguments and correlation evidence apply to advertising expenditures.[10]

Industry Abnormal ROE and Industry Characteristics

Industries are classified on the basis of three-digit SIC codes. Industry abnormal ROE, economic rent proxies (except concentration), and conservative accounting factors are weighted averages of accompanying firm measures. The weight for an industry measure is the denominator used to calculate the accompanying firm measure. For example, the weight for industry abnormal ROE is beginning-of-period book value of equity. Industry concentration is proxied by the Herfindahl Index, calculated as the sum of squared market shares of all firms in an industry—the higher the Herfindahl Index, the more concentrated the industry.

Other Factors

Prior research suggests that special items, accruals, and the magnitude of abnormal ROE might negatively affect the persistence of firm performance (Brooks and Buckmaster 1976; Fairfield et al. 1996; Sloan 1996). Accordingly, the empirical analyses include these variables, referred to as other factors, as control variables when analyzing the incremental explanatory power of economic rent proxies and conservative accounting factors. These variables are measured in absolute values, and special items and total accruals are scaled by beginning-of-period book value of equity, as done in prior research.

Variable measurement is summarized in Appendix B.

Descriptive Statistics

Panel A of Table 1 reports variable means and medians at the industry and firm levels. Industry abnormal ROE has a mean of −0.017 and firm abnormal ROE has a mean of −0.053.[11] The cost of equity is around 0.14. On average, a firm enjoys 5 percent of the product market and has about $130 million of assets (the table reports log values.) The Herfindahl Index for an industry is around 0.24. R&D expenditures are around 1.5 percent

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[9] This low correlation reflects the underlying low association between the level and the growth of R&D expenditures.

[10] Nevertheless, readers should interpret the results with caution. Using R&D and advertising intensity to proxy for economic rents is somewhat arbitrary and might capture conservative accounting effects. Also, the CAF measure is sensitive to the amortization method and the cost of equity estimation.

[11] The reason for the negative mean abnormal ROE could be that: (1) the equity premium is overestimated; (2) bankrupt firms included in the Compustat Research file have low or negative ROE; or (3) firms with high growth in R&D or advertising expenditures in the sample period have negative abnormal ROE because of conservative accounting. Firms in the last two scenarios are generally small and have lower weight in calculating the mean industry abnormal ROE (book-value-weighted average of firm abnormal ROE) than in calculating the mean firm abnormal ROE (equal-weighted average). This explains why the mean firm abnormal ROE is more negative than the mean industry abnormal ROE.

TABLE 1
Descriptive Statistics

Descriptive statistics on all variables, except the market-to-book ratio and estimated reserves, are based on the sample for the abnormal ROE analysis: 22,536 firm-year observations in the period 1976–1997 for firm level analyses and 3,270 industry-year observations in the same period for industry level analyses. Descriptive statistics on the market-to-book ratio and estimated reserves are based on the sample for the market-to-book ratio analysis: 19,898 firm-year observations for firm level analyses and 3,396 industry-year observations for industry level analyses. See Appendix B for variable measurement.

Panel A: Descriptive Statistics on Industry and Firm Characteristics

	Industry Level		Firm Level	
Variable	**Mean**	**Median**	**Mean**	**Median**
Abnormal ROE	−0.017	−0.010	−0.053	−0.031
Firm differential abnormal ROE	NA	NA	−0.024	−0.006
Cost of equity	0.136	0.140	0.139	0.142
Market-to-book ratio	1.947	1.848	1.944	1.374
Market share	NA	NA	0.049	0.008
Firm size	NA	NA	4.961	4.835
Concentration	0.236	0.208	NA	NA
Barriers to entry				
R&D intensity	0.015	0.007	0.034	0.012
Advertising intensity	0.020	0.012	0.019	0.010
Capital intensity	0.040	0.032	0.039	0.030
Estimated reserves (scaled by book value of equity)				
R&D	0.088	0.080	0.161	0.069
Advertising	0.025	0.021	0.021	0.007
Conservative accounting factors				
R&D	0.005	0.001	0.005	0.000
Advertising	0.000	0.000	0.001	0.000
Other factors				
Special items	0.025	0.012	0.023	0.000
Total accruals	0.174	0.152	0.184	0.123
Magnitude of industry or firm differential abnormal ROE	0.069	0.050	0.122	0.076

(continued on next page)

TABLE 1 (continued)

Panel B: Correlations between Variables

The upper (lower) triangle reports Spearman correlations between variables at the industry (firm) level. Abnormal ROE refers to industry abnormal ROE in the upper triangle and firm differential abnormal ROE in the lower triangle. Unless noted, the correlation is significant at the 0.05 level.

	Abnormal ROE	Market Share	Firm Size	Concentration	R&D Intensity	Advertising Intensity	Capital Intensity	Conservative Accounting Factor		Special Items	Total Accruals
								R&D	Advertising		
Abnormal ROE		NA	NA	0.03[#]	−0.01[#]	0.15	−0.14	0.15	0.16	−0.25	−0.17
Market share	0.15		NA	NA	NA	NA	NA	NA	NA	NA	NA
Firm size	0.18	0.72		NA	NA	NA	NA	NA	NA	NA	NA
Concentration	NA	NA	NA		−0.02[#]	−0.07	−0.04	0.05	0.03[#]	−0.13	−0.09
R&D intensity	−0.03	−0.21	0.04	NA		−0.10	0.36	0.30	−0.01[#]	0.11	−0.05
Advertising intensity	0.03	0.01	0.02	NA	0.05		−0.21	−0.09	−0.02[#]	0.08	−0.08
Capital intensity	−0.18	−0.09	0.16	NA	0.29	−0.12		0.15	−0.04	0.23	0.21
Conservative accounting factor—R&D	0.22	0.05	0.00[#]	NA	−0.05	−0.08	0.03		0.22	0.09	0.02[#]
Conservative accounting factor—advertising	0.15	0.02	0.00[#]	NA	−0.02	0.01[#]	0.01	0.07		0.03[#]	−0.01[#]
Special items	−0.24	0.03	0.12	NA	0.08	0.03	0.16	0.10	0.06		0.30
Total accruals	−0.09	−0.05	−0.02	NA	−0.05	−0.03	0.12	0.04	0.01	0.17	

[#] The correlation is insignificant at the 0.05 level.

of sales for average industries and 3 percent for average firms; advertising intensity is around 2 percent and capital intensity is around 4 percent.

At the firm level, unrecognized assets from R&D and advertising expenditures equal 16 percent and 2 percent of book value of equity, respectively. The ratios are 9 percent and 3 percent at the industry level. As discussed in Section II, conservative accounting policies increase abnormal ROE for firms with high growth in investments and decrease abnormal ROE for those with low growth; thus the average conservative accounting factor is around zero.

While the magnitude of special items is relatively small, about 2 percent of book value of equity, the absolute value of total accruals is about 18 percent of book value of equity. The absolute value of industry abnormal ROE and firm differential abnormal ROE are on average 0.07 and 0.12, respectively.

Panel B of Table 1 reports the correlations between variables, the upper triangle for industry characteristics and the lower triangle for firm characteristics. Although most correlations are significantly different from zero, they are generally small and the regressions are not subject to multicollinearity based on the condition index (Belsley et al. 1980).[12]

IV. ABNORMAL ROE ANALYSES

Assuming that industry and firm differential abnormal ROE follows an AR(1) process, this section examines whether the AR(1) parameters vary with economic rent proxies and conservative accounting factors as hypothesized above.[13] I first report results when economic rent proxies and conservative accounting factors are used to explain the persistence of industry abnormal ROE and firm differential abnormal ROE. I then extend the analyses by allowing the permanent level of abnormal ROE to vary as well. A discussion of sensitivity tests concludes this section.

The Industry Abnormal ROE Analysis

This subsection investigates whether industry economic rent proxies and conservative accounting factors help predict future abnormal ROE using the following regression:

$$\begin{aligned} ROE^a_{t+1} = {} & \phi_0 + \alpha_0 ROE^a_t + \alpha_1 ROE^a_t \times Concentration_t \\ & + \alpha_2 ROE^a_t \times Barriers\ to\ entry_t \\ & + \alpha_3 ROE^a_t \times Conservative\ accounting\ factors_t + \alpha_4 ROE^a_t \\ & \times Other\ factors_t + \varepsilon_{t+1}. \end{aligned} \tag{4}$$

The industry subscript is dropped from all variables for ease of notation. Industry characteristics are mean-adjusted within each year so that α_0 represents the average persistence of industry abnormal ROE. See Appendix B for variable measurement. Hypotheses 1 and 2 imply that coefficients on concentration, barriers to entry (except capital intensity), and conservative accounting factors are positive.

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[12] As reported in Panel B, firm size is highly correlated with market share. This high correlation could lead to insignificant coefficients on firm size and market share even if they jointly have significant explanatory power. Accordingly, the regression analyses use residuals from yearly regressions of firm size on market share to capture the incremental impact of firm size beyond market share. The underlying assumption of this approach is that market share is a more fundamental economic construct.

[13] Unlike this paper, prior research generally assumes the parameters to be constant across firms and over time.

Table 2 reports yearly regression results. t-statistics of average coefficients are used to test significance levels (Fama and MacBeth 1973). As in the regressions presented below, all independent variables are winsorized at the 1st and 99th percentiles to reduce the influence of extreme values. For comparison purposes, Column A reports results when only the current industry abnormal ROE and other factors are included. The average persistence of industry abnormal ROE is 0.79. Consistent with prior research, special items, total accruals, and the magnitude of industry abnormal ROE have negative coefficients.

Column B reports the results from the full model. Although the impact of concentration is insignificant, the impact of barriers to entry is significantly positive, as expected. Also as expected, the R&D conservative accounting factor has a significantly positive impact. The advertising conservative accounting factor has an insignificant coefficient, probably due to the short useful life of advertising investments (Kothari et al. 2002). Overall, including industry economic rent proxies and conservative accounting factors significantly increases

TABLE 2
The Industry Abnormal ROE Analysis

$$\begin{aligned} ROE^a_{t+1} = {} & \phi_0 + \alpha_0 ROE^a_t + \alpha_1 ROE^a_t \times Concentration_t + \alpha_2 ROE^a_t \times Barriers\ to\ entry_t \\ & + \alpha_3 ROE^a_t \times Conservative\ accounting\ factors_t + \alpha_4 ROE^a_t \times Other\ factors_t \\ & + \varepsilon_{t+1} \end{aligned} \quad (4)$$

ROE^a_t is industry abnormal ROE. The industry subscript is dropped from all variables for ease of notation. See Appendix B for variable measurement. The analysis is based on 3,270 industry-year observations in the period 1976–1997. Regressions are estimated yearly and industry characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. t-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in Column B is higher than that in Column A. The median p-value of yearly Wald tests is reported.

	Predicted Signs	Column A		Column B	
		Coefficient	t	Coefficient	t
Intercept	?	−0.00	−3.06	−0.00	−4.88
ROE^a	+	0.79	27.29	0.79	25.40
ROE^a × Concentration	+			0.05	0.48
ROE^a × Barriers to entry					
R&D intensity	+			0.62	1.69
Advertising intensity	+			2.75	3.04
Capital intensity	?			1.17	2.28
ROE^a × Conservative accounting factors					
R&D	+			0.69	1.88
Advertising	+			−2.49	0.74
ROE^a × Other factors					
Special items	−	−3.21	−2.33	−3.45	−2.85
Total accruals	−	−0.31	−1.96	−0.21	−1.66
Magnitude of industry abnormal ROE	−	−0.14	−0.78	−0.07	−0.29
Adjusted R^2		0.61		0.64	
p-value of Wald test				0.0257	

the explanatory power. The adjusted R^2 increases from 0.61 in Column A to 0.64 in Column B, significant at the 0.0257 level based on Wald tests.[14,15]

The Firm Abnormal ROE Analysis

This subsection investigates whether firm economic rent proxies and conservative accounting factors help predict firm abnormal ROE using the following regression:

$$\begin{aligned} ROE^a_{t+1} = {} & \phi_0 + \phi_1 R\hat{O}E^a_{j,t+1} + \alpha_0 DROE^a_t + \alpha_1 DROE^a_t \times \textit{Market share}_t \\ & + \alpha_2 DROE^a_t \times \textit{Firm size}_t + \alpha_3 DROE^a_t \times \textit{Barriers to entry}_t \\ & + \alpha_4 DROE^a_t \times \textit{Conservative accounting factors}_t \\ & + \alpha_5 DROE^a_t \times \textit{Other factors}_t + \varepsilon_{t+1}. \end{aligned} \tag{5}$$

The firm subscript is dropped from all variables except the *predicted* future industry abnormal ROE ($R\hat{O}E^a_{j,t+1}$), for which subscript j represents industry j to which the firm belongs. $R\hat{O}E^a_{j,t+1}$ is used to capture the industry component of future firm abnormal ROE.[16] Firm characteristics are mean-adjusted within each year so that α_0 represents the average persistence of firm differential abnormal ROE. See Appendix B for variable measurement. Hypotheses 1 and 3 suggest that coefficients on market share, firm size, barriers to entry (except capital intensity), and conservative accounting factors are positive.

Table 3 reports yearly regression results. For comparison purposes, Column A only includes predicted future industry abnormal ROE, current firm differential abnormal ROE, and other factors, and Column B reports the results from the full model. As expected, the impact of market share, firm size, and barriers to entry is significantly positive. The coefficient on the R&D conservative accounting factor is significantly positive as predicted, but that on the advertising conservative accounting factor is insignificant. Overall, incorporating firm economic characteristics and conservative accounting factors significantly increases the explanatory power. The adjusted R^2 increases from 0.30 in Column A to 0.34 in Column B, significant at the 0.0003 level based on Wald tests.

In sum, the results in this and the previous subsection suggest that as expected, economic rent proxies and conservative accounting factors are positively associated with the persistence of abnormal ROE. Allowing the persistence to vary with these determinants increases the explanatory power by 5 percent and 13 percent for industry and firm differential abnormal ROE, respectively.

Explaining the Permanent Level of Abnormal ROE

While allowing the persistence of the AR(1) process to vary, the above analyses assume its intercept, which captures the mean abnormal ROE, to be constant across industries and firms. Prior research suggests that this assumption might not hold. Mueller (1977) argues

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[14] This paper uses Wald tests to compare explanatory power of alternative model specifications and reports median p-values of yearly Wald tests.

[15] This relatively small improvement partly results from not controlling for the variation in the permanent level, as discussed later.

[16] Using realized future industry abnormal ROE is inconsistent with forecasting purposes. Predicted future industry abnormal ROE is estimated from rolling AR(1) regressions of abnormal ROE for individual industries. For example, to predict an industry's abnormal ROE in 1990, all available abnormal ROE of the industry up to 1989 (since 1963) are used to estimate an AR(1) process. The estimated parameters and abnormal ROE in 1989 are then used to predict industry abnormal ROE in 1990. To ensure the accuracy of estimating AR(1), at least 12 time-series observations are used.

TABLE 3
The Firm Abnormal ROE Analysis

$$\begin{aligned} ROE^a_{t+1} = {} & \phi_0 + \phi_1 R\hat{O}E^a_{j,t+1} + \alpha_0 DROE^a_t + \alpha_1 DROE^a_t \times Market\ share_t + \alpha_2 DROE^a_t \\ & \times Firm\ size_t + \alpha_3 DROE^a_t \times Barriers\ to\ entry_t + \alpha_4 DROE^a_t \\ & \times Conservative\ accounting\ factors_t + \alpha_5 DROE^a_t \times Other\ factors_t + \varepsilon_{t+1} \qquad (5) \end{aligned}$$

ROE^a_t is firm abnormal ROE, $R\hat{O}E^a_{j,t+1}$ is predicted future industry abnormal ROE, and $DROE^a_t$ is firm differential abnormal ROE. The firm subscript is dropped from all variables except $R\hat{O}E^a_{j,t+1}$, for which subscript j represents industry j to which the firm belongs. See Appendix B for variable measurement. The analysis is based on 22,536 firm-year observations in the period 1976–1997. Regressions are estimated yearly and firm characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. t-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in Column B is higher than that in Column A. The median p-value of yearly Wald tests is reported.

	Predicted Signs	Column A		Column B	
		Coefficient	t	Coefficient	t
Intercept	?	−0.04	−5.40	−0.03	−5.27
Predicted future industry abnormal ROE	+	0.78	18.27	0.79	18.28
DROE^a	+	0.62	34.77	0.61	29.44
DROE^a × *Market share*	+			0.17	2.00
DROE^a × *Firm size*	+			0.01	1.98
DROE^a × *Barriers to entry*					
R&D intensity	+			0.45	2.07
Advertising intensity	+			1.07	2.66
Capital intensity	?			0.82	2.41
DROE^a × *Conservative accounting factors*					
R&D	+			0.31	2.30
Advertising	+			−0.38	−0.42
DROE^a × *Other factors*					
Special items	−	−0.84	−10.33	−0.94	−10.94
Total accruals	−	−0.19	−4.07	−0.15	−3.16
Magnitude of firm differential abnormal ROE	−	−0.20	−2.37	−0.26	−3.01
Adjusted R^2		0.30		0.34	
p-value of Wald test				0.0003	

that because firms spend resources to maintain barriers to entry and economic rents, there might be permanent differences in profitability across industries and firms. Consistent with this argument, Mueller (1977) finds that firm profitability does not converge to the competitive rate of return. Mueller (1986) further argues that these differences vary systematically with industry and firm characteristics. Similarly, Zhang (2000) models the impact of conservative accounting on earnings in a *steady* state and shows that the impact could be nonzero and varies with industry and firm characteristics as well.

This subsection extends the above analyses by allowing the mean abnormal ROE, referred to as the permanent level, to vary with economic rent proxies and conservative accounting factors. Since the intercept of an AR(1) process is the product of the mean and 1 minus the persistence, the regression equation for industry abnormal ROE becomes:[17]

$$ROE^a_{t+1} = ROE^a(1 - \rho) + \rho ROE^a_t + \varepsilon_{t+1},$$

where both the permanent level (ROE^a) and the persistence (ρ) are expressed as functions of economic rent proxies and conservative accounting factors:

$$\begin{aligned} ROE^a &= \beta_0 + \beta_1 Concentration_t + \beta_2 Barriers\ to\ entry_t \\ &\quad + \beta_3 Conservative\ accounting\ factors_t \\ \rho &= \alpha_0 + \alpha_1 Concentration_t + \alpha_2 Barriers\ to\ entry_t \\ &\quad + \alpha_3 Conservative\ accounting\ factors_t + \alpha_4 Other\ factors_t. \end{aligned}$$

Coefficients α's capture the impact on the persistence, as in Equation (4), and coefficients β's capture the impact on the permanent level.

Table 4 reports yearly regression results. Since the regression equation is nonlinear in the coefficients, the nonlinear OLS regression method is used.[18] The results for persistence are similar to those reported in Table 2. The impact of industry concentration on the permanent level is significantly positive, suggesting that concentrated industries can earn positive abnormal ROE in the long run. R&D intensity and advertising intensity have a significantly positive impact, as expected. Capital intensity has a negative impact (marginally significant). Conservative accounting factors have a positive impact on the permanent level, as expected. Overall, controlling for the impact of industry characteristics on both the persistence and the permanent level increases the adjusted R^2 from 0.61 in Column A, when only current industry abnormal ROE and other factors are included, to 0.67 in Column B, significant at the 0.0012 level.

The regression equation for firm abnormal ROE is constructed similarly and Table 5 reports regression results. The results for persistence are similar to those reported in Table 3. The impact of both market share and firm size on the permanent level is significantly positive. The impact of barriers to entry is mixed—marginally significantly positive for R&D intensity, insignificant for advertising intensity, and significantly negative for capital intensity. The impact of the R&D conservative accounting factor is significantly positive, but that of the advertising conservative accounting factor is insignificant. Overall, the adjusted R^2 increases from 0.31 in Column A to 0.37 in Column B, significant at the 0.0001 level.

Comparing the results in Table 4 with those in Table 2, or Table 5 with Table 3, suggests that controlling for the cross-sectional variation in the permanent level further increases the explanatory power. Untabulated results suggest that the increases are significant. In sum, compared to a model with current abnormal ROE and other factors, using economic rent proxies and conservative accounting factors to explain the variation in both the persistence

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[17] To see this, one can write an AR(1) process as: $ROE^a_{t+1} = \phi_0 + \rho ROE^a_t + \varepsilon_{t+1}$. Taking expectations of both sides yields: $E(ROE^a_{t+1}) = \phi_0 + \rho E(ROE^a_t)$. Denoting the mean abnormal ROE as ROE^a and rearranging terms, one can obtain: $\phi_0 = ROE^a(1 - \rho)$; that is, the intercept is the product of the mean and 1 minus the persistence. Expressing the intercept in the AR(1) process this way yields the regression equation.

[18] The idea of the nonlinear OLS regression is similar to that of the OLS regression: minimizing the sum of squared errors. Basically, estimates of the coefficients are revised repeatedly to reduce the sum of squared errors; an optimal set of coefficient estimates is found when no further improvement can be obtained.

TABLE 4
The Industry Abnormal ROE Analysis: Explaining Both the Persistence and the Permanent Level

This table reports the results from the following regression that allows both the persistence of industry abnormal ROE and its permanent level to vary with economic rent proxies and conservative accounting factors:

$$ROE^a_{t+1} = ROE^a(1 - \rho) + \rho ROE^a_t + \varepsilon_{t+1},$$

where the permanent level (ROE^a) and the persistence (ρ) are expressed as:

$$\begin{aligned} ROE^a = {} & \beta_0 + \beta_1 \mathit{Concentration}_t + \beta_2 \mathit{Barriers\ to\ entry}_t \\ & + \beta_3 \mathit{Conservative\ accounting\ factors}_t \end{aligned}$$

$$\begin{aligned} \rho = {} & \alpha_0 + \alpha_1 \mathit{Concentration}_t + \alpha_2 \mathit{Barriers\ to\ entry}_t \\ & + \alpha_3 \mathit{Conservative\ accounting\ factors}_t + \alpha_4 \mathit{Other\ factors}_t \end{aligned}$$

ROE^a_t is industry abnormal ROE. The industry subscript is dropped from all variables for ease of notation. See Appendix B for variable measurement. The analysis is based on 3,270 industry-year observations in the period 1976–1997. Regressions are estimated yearly using the nonlinear OLS regression method and industry characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. t-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in Column B is higher than that in Column A. The median p-value of yearly Wald tests is reported.

	Predicted	Column A		Column B	
	Signs	**Coefficient**	**t**	**Coefficient**	**t**
Explaining the persistence ($\alpha_0, \alpha_1, \ldots, \alpha_4$)					
Intercept	+	0.82	27.80	0.82	22.80
Concentration	+			0.02	0.17
Barriers to entry					
R&D intensity	+			2.12	2.84
Advertising intensity	+			1.92	2.85
Capital intensity	?			0.78	2.21
Conservative accounting factors					
R&D	+			0.94	1.97
Advertising	+			1.60	0.46
Other factors					
Special items	−	−2.99	−2.03	−2.77	−5.87
Total accruals	−	−0.25	−1.42	−0.34	−2.84
Magnitude of industry abnormal ROE	−	−0.03	−0.92	−0.12	−2.54
Explaining the permanent level ($\beta_0, \beta_1, \ldots, \beta_3$)					
Intercept	?	0.06	1.23	0.03	1.99
Concentration	+			0.06	2.25
Barriers to entry					
R&D intensity	+			2.47	2.06
Advertising intensity	+			0.92	2.55
Capital intensity	?			−1.48	−1.58
Conservative accounting factors					
R&D	+			2.61	1.73
Advertising	+			7.27	2.97
Adjusted R^2		0.61		0.67	
P-value of Wald test				0.0012	

of abnormal ROE and its permanent level increases the adjusted R^2 by 10 percent and 20 percent for industry and firm abnormal ROE analyses, respectively.

Sensitivity Tests

Industry Classification

Industry classification involves a trade-off between homogeneity of firms in the same industry and appropriate classification for diversified firms. The more detailed the industry classification, the more homogenous the nondiversified firms in an industry are, but the more problematic is the classification for diversified firms. Unfortunately, there is no agreement on appropriate industry classification. Using four-digit SIC industries or the industry classification in Fama and French (1997) yields similar results.

Variable Measurement

First, using total market share of the four largest firms in an industry, instead of the Herfindahl Index, to proxy for industry concentration yields similar results. Second, the results based on alternative estimates of the industry equity premium are similar: (1) the average historical equity premium for all industries (0.0516, as reported in Fama and French 1997), (2) Capital Asset Pricing Model (CAPM), and (3) the three-factor model. Using the firm cost of equity estimated from CAPM or the three-factor model also yields similar results. Third, the impact of market share and firm size could be confounded by diversification because market share and firm size might be correlated with diversification and diversification can result in a deviation of firm performance from the industry level (Mueller

TABLE 5
The Firm Abnormal ROE Analysis:
Explaining Both the Persistence and the Permanent Level

This table reports the results from the following regression that allows both the persistence of firm differential abnormal ROE and its permanent level to vary with economic rent proxies and conservative accounting factors:

$$ROE^a_{t+1} = \phi_1 R\hat{O}E^a_{j,t+1} + DROE^a(1 - \rho) + \rho DROE^a_t + \varepsilon_{t+1},$$

where the permanent level ($DROE^a$) and the persistence (ρ) are expressed as:

$$\begin{aligned} DROE^a &= \beta_0 + \beta_1 \mathit{Market\ share}_t + \beta_2 \mathit{Firm\ size}_t + \beta_3 \mathit{Barriers\ to\ entry}_t \\ &\quad + \beta_4 \mathit{Conservative\ accounting\ factors}_t \\ \rho &= \alpha_0 + \alpha_1 \mathit{Market\ share}_t + \alpha_2 \mathit{Firm\ size}_t + \alpha_3 \mathit{Barriers\ to\ entry}_t \\ &\quad + \alpha_4 \mathit{Conservative\ accounting\ factors}_t + \alpha_5 \mathit{Other\ factors}_t \end{aligned}$$

ROE^a_t is firm abnormal ROE, $R\hat{O}E^a_{j,t+1}$ is predicted future industry abnormal ROE, and $DROE^a_t$ is firm differential abnormal ROE. The firm subscript is dropped from all variables except $R\hat{O}E^a_{j,t+1}$, for which subscript *j* represents industry *j* to which the firm belongs. See Appendix B for variable measurement. The analysis is based on 22,536 firm-year observations in the period 1976–1997. Regressions are estimated yearly using the nonlinear OLS regression method and firm characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. t-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in Column B is higher than that in Column A. The median p-value of yearly Wald tests is reported.

(*continued on next page*)

TABLE 5 (continued)

	Predicted Signs	Column A		Column B	
		Coefficient	t	Coefficient	t
Predicted future industry abnormal ROE (ϕ_1)	+	0.77	18.87	0.76	19.37
Explaining the persistence (α_0, α_1,...,α_5)					
Intercept	+	0.60	30.14	0.60	24.24
Market share	+			0.17	2.30
Firm size	+			0.02	2.00
Barriers to entry					
R&D intensity	+			0.15	1.82
Advertising intensity	+			0.14	2.16
Capital intensity	?			0.17	2.35
Conservative accounting factors					
R&D	+			0.58	2.40
Advertising	+			−0.89	−0.79
Other factors					
Special items	−	−0.84	−9.03	−1.06	−11.17
Total accruals	−	−0.16	−3.73	−0.16	−3.65
Magnitude of firm differential abnormal ROE	−	−0.24	−3.22	−0.25	−4.08
Explaining the permanent level (β_0, β_1,...,β_4)					
Intercept	?	−0.11	−5.28	−0.11	−4.40
Market share	+			0.48	4.67
Firm size	+			0.02	3.45
Barriers to entry					
R&D intensity	+			0.32	1.67
Advertising intensity	+			−0.31	−0.96
Capital intensity	?			−0.92	−2.95
Conservative accounting factors					
R&D	+			0.28	1.66
Advertising	+			0.72	0.63
Adjusted R^2		0.31		0.37	
p-value of Wald test				0.0001	

1977). Controlling for diversification (measured as the sum of squared sales shares of all industry segments in the firm) does not change the inferences.

Finally, because the measurement of certain variables (capital intensity, firm size, special items, and total accruals) is affected by accounting choices, their coefficients might be confounded by conservative accounting effects. Using alternative measurements that are less likely to be affected by accounting choices—the ratio of plant, property, and equipment to sales as a proxy for capital intensity, natural logarithm of sales for firm size, and special items and total accruals scaled by sales—yields similar results.

Model Estimation

This paper does not analyze the impact of financial leverage on abnormal ROE based on the notion that financial activities do not create abnormal profits and are accounted for unbiasedly (Feltham and Ohlson 1995). Controlling for financial leverage in the empirical analyses by adding a main effect and an interaction with current abnormal ROE does not affect the inferences. Also, estimating pooled regressions yields similar results.

V. MARKET-TO-BOOK RATIO ANALYSES

The abnormal ROE analyses suggest that the determinants of abnormal ROE can improve forecasts of one-period-ahead abnormal ROE. However, if the information dynamic of abnormal ROE differs from an AR(1) process, investigating only one-period-ahead abnormal ROE is insufficient for valuation purposes. For instance, untabulated analyses suggest that an AR(2) process is more descriptive than an AR(1) process for about 35 percent of the industries with at least 25 years of consecutive data. Thus, this section *directly* links the determinants of abnormal ROE to firm value, i.e., the market-to-book ratio, to examine the extent to which integrating these determinants improves valuation implementations.

Like the abnormal ROE analyses, the market-to-book ratio analyses are conducted at both the industry and firm levels. Market value is measured four months after fiscal-year-ends so that the capital markets can integrate the information in the current year's financial statements. It is calculated as market value at fiscal-year-ends multiplied by cumulated returns in the four months afterwards. Overall, 3,396 industry-year observations and 19,898 firm-year observations in the period 1976–1997 are used in the industry and the firm market-to-book ratio analyses, respectively.[19] As reported in Panel A of Table 1, the mean of industry market-to-book ratios is 1.947 and the mean of firm market-to-book ratios is 1.944.

The Industry Market-to-Book Ratio Analysis

The regression specification for the market-to-book ratio analyses is derived from the RIM model. Scaling both sides of Equation (1′) under unbiased accounting by book value of equity under conservative accounting indicates that the market-to-book ratio: (1) increases with the difference in book value of equity between unbiased and conservative accounting, i.e., the estimated reserve, (2) decreases with the cost of equity, (3) increases with the growth of book value of equity, and (4) increases with future abnormal ROE under unbiased accounting, which in turn increases with current abnormal ROE and economic rent proxies.[20] Thus, the regression for the industry market-to-book ratio analysis is:

$$\begin{aligned}\frac{MV_t}{BV_t} = {} & \phi_0 + \phi_1 \frac{ER_t}{BV_t} + \beta_1 Cost\ of\ equity_t + \beta_2 Growth_t + \beta_3 Concentration_t \\ & + \beta_4 Barriers\ to\ entry_t + \alpha_0 ROE_t^a + \alpha_1 ROE_t^a \times Cost\ of\ equity_t \\ & + \alpha_2 ROE_t^a \times Growth_t + \alpha_3 ROE_t^a \times Concentration_t + \alpha_4 ROE_t^a \\ & \times Barriers\ to\ entry_t + \alpha_5 ROE_t^a \times Other\ factors_t + \varepsilon_t. \qquad (6)\end{aligned}$$

The industry subscript is dropped from all variables for ease of notation. The main effects of industry characteristics are included to capture the permanent level effect and their interactions with abnormal ROE are included to capture the persistence effect. Growth is defined as the percentage change in book value of equity. Other variables are defined as before (see Appendix B for variable measurement.)

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[19] The market-to-book ratio analyses have slightly different samples from the abnormal ROE analyses because the former require data on market value and the latter require data on future abnormal ROE.

[20] See Cheng (2002) for a detailed discussion of the link from determinants of abnormal ROE to the market-to-book ratio. Theoretically, conservative accounting effects should also be controlled for by adjusting abnormal ROE for CAF. For simplicity, the analyses here do not make such adjustments; doing so does not affect the inferences.

Table 6 reports the yearly regression results from Equation (6) and, for comparison purposes, the results from two simpler specifications.[21] Column A includes only current industry abnormal ROE and other factors. Column B controls for conservative accounting effects by adding estimated reserves. As expected, coefficients on estimated reserves are significantly positive. The adjusted R^2 increases from 0.25 to 0.29, significant at the 0.01 level. This suggests that incorporating conservative accounting effects helps explain the variation in the industry market-to-book ratio.

Column C reports the results from the full model. Although coefficients on estimated reserves become insignificant after controlling for other industry characteristics, coefficients on most other industry characteristics are significant in the predicted directions. The adjusted R^2 increases from 0.29 in Column B to 0.35 in Column C, significant at the 0.0036 level. Overall, these results suggest that incorporating economic and accounting characteristics helps explain the variation in the industry market-to-book ratio.

The Firm Market-to-Book Ratio Analysis

The regression for the firm market-to-book ratio analysis is constructed similarly:

$$\begin{aligned}\frac{MV_t}{BV_t} = {} & \phi_0 + \phi_1 \frac{MV_{j,t-1}}{BV_{j,t-1}} + \phi_2 \hat{ROE}_j^a + \phi_3 \frac{ER_t}{BV_t} + \beta_1 \mathit{Cost\ of\ equity}_t + \beta_2 \mathit{Growth}_t \\ & + \beta_3 \mathit{Market\ share}_t + \beta_4 \mathit{Firm\ size}_t + \beta_5 \mathit{Barries\ to\ entry}_t + \alpha_0 \mathit{DROE}_t^a \\ & + \alpha_1 \mathit{DROE}_t^a \times \mathit{Cost\ of\ equity}_t + \alpha_2 \mathit{DROE}_t^a \times \mathit{Growth}_t + \alpha_3 \mathit{DROE}_t^a \\ & \times \mathit{Market\ share}_t + \alpha_4 \mathit{DROE}_t^a \times \mathit{Firm\ size}_t + \alpha_5 \mathit{DROE}_t^a \\ & \times \mathit{Barriers\ to\ entry}_t + \alpha_6 \mathit{DROE}_t^a \times \mathit{Other\ factors}_t + \varepsilon_t. \end{aligned} \tag{7}$$

The firm subscript is dropped from all variables except lagged industry market-to-book ratio ($MV_{j,t-1}/BV_{j,t-1}$) and the estimated industry permanent abnormal ROE ($\hat{ROE}_j^a$), for which subscript j represents industry j to which the firm belongs. These two industry variables are included to capture the industry level market-to-book variation.[22] The industry permanent abnormal ROE is estimated from rolling AR(1) regressions of abnormal ROE for individual industries, as explained in Section IV. Other variables are defined as before (see Appendix B for variable measurement.)

Table 7 reports the yearly regression results from Equation (7) and from two simpler specifications to test the incremental explanatory power of conservative accounting and other firm characteristics separately. Column A includes lagged industry market-to-book ratio, the estimated industry permanent abnormal ROE, current firm differential abnormal ROE, and other factors. Column B controls for conservative accounting effects by adding estimated reserves. As expected, coefficients on estimated reserves are significantly positive. The adjusted R^2 increases from 0.33 to 0.38, significant at the 0.0001 level.

Column C reports the results from the full model. As expected, coefficients on the cost of equity and on its interaction with firm differential abnormal ROE are significantly negative. Also as expected, coefficients on growth, market share, firm size, R&D intensity, and their interactions with firm differential abnormal ROE are significantly positive, except that

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[21] All observations with an absolute value of R-student measure greater than 3 are identified as outliers and excluded (Belsley et al. 1980). Note that the abnormal ROE analyses do not identify or exclude outliers because doing so requires information about future abnormal ROE and is inconsistent with forecasting purposes.

[22] Using contemporaneous industry market-to-book ratio is inconsistent with valuation purposes.

TABLE 6
The Industry Market-to-book Ratio Analysis

$$\frac{MV_t}{BV_t} = \phi_0 + \phi_1 \frac{ER_t}{BV_t} + \beta_1 Cost\ of\ equity_t + \beta_2 Growth_t + \beta_3 Concentration_t$$
$$+ \beta_4 Barriers\ to\ entry_t + \alpha_0 ROE^a_t + \alpha_1 ROE^a_t \times Cost\ of\ equity_t + \alpha_2 ROE^a_t$$
$$\times Growth_t + \alpha_3 ROE^a_t \times Concentration_t + \alpha_4 ROE^a_t \times Barriers\ to\ entry_t$$
$$+ \alpha_5 ROE^a_t \times Other\ factors_t + \varepsilon_t \qquad (6)$$

MV is market value, *BV* is book value of equity, *ER* is the estimated reserve, and ROE^a_t is industry abnormal ROE. The industry subscript is dropped from all variables for ease of notation. See Appendix B for variable measurement. The analysis is based on 3,396 industry-year observations in the period 1976–1997. Regressions are estimated yearly and industry characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. t-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in one column is higher than that in the previous column. The median p-value of yearly Wald tests is reported.

	Predicted Signs	Column A		Column B		Column C	
		Coefficient	**t**	**Coefficient**	**t**	**Coefficient**	**t**
Intercept	+	1.97	8.34	1.92	9.15	2.25	5.22
Estimated reserves							
R&D	+			0.61	2.28	−0.40	−0.88
Advertising	+			2.75	3.23	−0.27	−0.19
Cost of equity	−					−1.30	−1.99
Growth	+					0.01	0.05
Concentration	+					−0.62	−0.11
Barriers to entry							
R&D intensity	+					5.35	2.37
Advertising intensity	+					3.75	2.82
Capital intensity	?					−1.88	−2.80
ROE^a	+	5.33	15.61	6.50	17.20	5.05	13.09
ROE^a × Cost of equity	−					1.28	0.17
ROE^a × Growth	+					1.06	2.09
ROE^a × Concentration	+					0.41	1.63
ROE^a × Barriers to entry							
R&D intensity	+					24.62	1.93
Advertising intensity	+					11.22	1.63
Capital intensity	?					−9.74	−1.19
ROE^a × Other factors							
Special items	−	−12.04	−2.66	−10.30	−2.46	−7.09	−1.88
Total accruals	−	−5.34	−4.65	−5.12	−4.76	−4.26	−2.46
Magnitude of industry abnormal ROE	−	−5.91	−3.15	−4.77	−2.58	−7.85	−3.65
Adjusted R^2		0.25		0.29		0.35	
p-value of Wald test				0.0092		0.0036	

firm size has an insignificant main effect and market share has an insignificant interaction effect. The adjusted R^2 increases further from 0.38 in Column B to 0.44 in Column C, significant at the 0.0001 level.

TABLE 7
The Firm Market-to-Book Ratio Analysis

$$\frac{MV_t}{BV_t} = \phi_0 + \phi_1 \frac{MV_{j,t-1}}{BV_{j,t-1}} + \phi_2 R\hat{O}E_j^a + \phi_3 \frac{ER_t}{BV_t} + \beta_1 Cost\ of\ equity_t + \beta_2 \mathrm{Growth}_t$$
$$+ \beta_3 Market\ share_t + \beta_4 Firm\ size_t + \beta_5 Barriers\ to\ entry_t + \alpha_0 DROE_t^a + \alpha_1 DROE_t^a$$
$$\times\ Cost\ of\ equity_t + \alpha_2 DROE_t^a \times Growth_t + \alpha_3 DROE_t^a \times Market\ share_t$$
$$+ \alpha_4 DROE_t^a \times Firm\ size_t + \alpha_5 DROE_t^a \times Barriers\ to\ entry_t$$
$$+ \alpha_6 DROE_t^a \times Other\ factors_t + \varepsilon_t \qquad (7)$$

MV is market value, *BV* is book value of equity, $R\hat{O}E_j^a$ is the estimated industry permanent abnormal ROE, *ER* is the estimated reserve, and $DROE_t^a$ is firm differential abnormal ROE. The firm subscript is dropped from all variables except $MV_{j,t-1}/BV_{j,t-1}$ and $R\hat{O}E_j^a$, for which subscript *j* represents industry *j* to which the firm belongs. See Appendix B for variable measurement. The analysis is based on 19,898 firm-year observations in the period 1976–1997. Regressions are estimated yearly and firm characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. t-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald test is used to test whether the explanatory power of the model specification in one column is higher than that in the previous column. The median p-value of yearly Wald tests is reported.

	Predicted Signs	Column A		Column B		Column C	
		Coefficient	t	Coefficient	t	Coefficient	t
Intercept	+	1.16	7.70	0.97	7.44	1.06	7.96
Lagged industry market-to-book ratio	+	0.36	14.04	0.35	14.51	0.33	12.85
Industry permanent abnormal ROE	+	4.31	7.68	3.33	7.06	2.68	6.11
Estimated reserves							
R&D	−			1.33	10.93	0.60	4.60
Advertising	−			1.23	2.26	1.90	2.95
Cost of equity	−					−2.74	−3.01
Growth	−					0.15	2.35
Market share	+					0.55	2.14
Firm size	+					0.02	1.32
Barriers to entry							
R&D intensity	+					3.77	5.32
Advertising intensity	+					0.04	0.06
Capital intensity	?					0.14	0.20
DROE^a	+	5.21	16.01	5.27	15.21	5.10	18.67
DROE^a × *Cost of equity*	−					−26.44	−5.85
DROE^a × *Growth*	+					0.50	3.27
DROE^a × *Market share*	+					−3.03	−0.74
DROE^a × *Firm size*	+					0.40	4.33
DROE^a × *Barriers to entry*							
R&D intensity	+					3.90	3.40
Advertising intensity	+					7.17	2.96
Capital intensity	?					−10.72	−3.25

(*continued on next page*)

TABLE 7 (continued)

	Predicted Signs	Column A Coefficient	Column A t	Column B Coefficient	Column B t	Column C Coefficient	Column C t
DROE[a] × *Other factors*							
Special items	−	−1.96	−2.71	−2.11	−3.62	−2.36	−2.64
Total accruals	−	0.07	0.21	−0.22	−0.58	−0.84	−2.14
Magnitude of firm differential abnormal ROE	−	−9.24	−10.65	−8.09	−10.42	−6.98	−9.86
Adjusted R^2		0.33		0.38		0.44	
p-value of Wald test				0.0001		0.0001	

In sum, the market-to-book ratio analyses suggest that integrating determinants of abnormal ROE can significantly improve the RIM's explanatory power for the market-to-book ratio. Additional analyses are conducted to investigate how well this approach performs relative to models used in prior studies. For example, Fairfield et al. (1996) find that disaggregating earnings can improve forecasts of future ROE, and Bhojraj and Lee (2002) find that certain industry and firm characteristics, including industry market-to-book ratio, firm profit margin, and analysts' growth forecasts, can help explain the firm market-to-book ratio. The results, not reported for the sake of brevity, suggest that integrating determinants of abnormal ROE provides significant incremental explanatory power over models used in prior research, such as Fairfield et al. (1996) in predicting future ROE and Bhojraj and Lee (2002) in explaining the firm market-to-book ratio.[23]

VI. CONCLUSIONS

This paper investigates what determines abnormal ROE. It uses industry and firm characteristics suggested by economic theories to capture economic rents and develops an empirical measure—the conservative accounting factor—to capture the impact of conservative accounting. The empirical analyses examine whether these determinants help predict future abnormal ROE and help explain the market-to-book ratio.

As expected, industry abnormal ROE increases with industry concentration, industry-level barriers to entry, and industry conservative accounting factors. Similarly, firm differential abnormal ROE increases with market share, firm size, firm-level barriers to entry, and firm conservative accounting factors. The market-to-book ratio analyses further indicate that integrating these determinants of abnormal ROE into the RIM significantly increases its explanatory power for the variation in the market-to-book ratio. The adjusted R^2 increases by 40 percent and 33 percent at the industry and firm levels, respectively, compared with a model with current abnormal ROE and other factors suggested by prior research (i.e., special items, total accruals, and the magnitude of abnormal ROE). Additional analyses indicate that these determinants provide incremental explanatory power over models analyzed in prior studies (e.g., Bhojraj and Lee 2002; Fairfield et al. 1996).

Overall, this paper contributes to the valuation literature by investigating determinants of abnormal ROE and by linking these determinants to firm value. The analyses demonstrate the importance of these determinants in predicting future abnormal ROE and in explaining the market-to-book ratio. These results are important not only for improving valuation implementations, but also for studies relying on the RIM valuation framework, by suggesting a list of economic and accounting control variables that can capture the cross-sectional variation in firm value.

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[23] The adjusted R^2 after integrating determinants of abnormal ROE into the model used in Fairfield et al. (Bhojraj and Lee) is 0.06 (0.11) higher, a relative increase of 20 percent (31 percent). Both increases are significant at the 0.001 level based on Wald tests. See Cheng (2002) for details.

APPENDIX A

Derivation of the Decomposition Equation (Equation (3))

Equation (2) in the paper:

$$X'_t - X_t = ER_t - ER_{t-1}, \tag{2}$$

links the difference in net income (X) under the two accounting systems (unbiased accounting and conservative accounting) to the change in the estimated reserve (ER). Accounting numbers under unbiased accounting are denoted by " ′ ".

Dividing both sides of Equation (2) by beginning-of-period book value of equity under conservative accounting yields:

$$\frac{X'_t}{BV_{t-1}} - \frac{X_t}{BV_{t-1}} = \frac{ER_t - ER_{t-1}}{BV_{t-1}}. \tag{2′}$$

The first term on the left-hand side of Equation (2′) can be expressed as:

$$\begin{aligned}\frac{X'_t}{BV_{t-1}} &= \frac{X'_t}{BV'_{t-1}} \cdot \frac{BV'_{t-1}}{BV_{t-1}} \\ &= \frac{X'_t}{BV'_{t-1}} \cdot \frac{BV_{t-1} + ER_{t-1}}{BV_{t-1}} \\ &= (ROE^{a'}_t + r) \cdot \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right),\end{aligned}$$

where $ROE^{a'}_t$ $(= X'_t/BV'_{t-1} - r)$ is abnormal ROE under unbiased accounting. (Recall that ER is defined as: $ER_t = BV'_t - BV_t$.) The second term on the left-hand side of Equation (2′), by the definition of abnormal ROE, can be expressed as: $X_t/BV_{t-1} = ROE^a_t + r$.

Thus, the left-hand side of Equation (2′) can be written as:

$$\begin{aligned}\frac{X'_t}{BV_{t-1}} - \frac{X_t}{BV_{t-1}} &= (ROE^{a'}_t + r) \cdot \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right) - (ROE^a_t + r) \\ &= ROE^{a'}_t \cdot \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right) + r \cdot \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right) - ROE^a_t - r \\ &= ROE^{a'}_t \cdot \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right) + r \cdot \frac{ER_{t-1}}{BV_{t-1}} - ROE^a_t.\end{aligned}$$

Substituting the above equation into Equation (2′) yields:

$$ROE^{a'}_t \cdot \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right) + r \cdot \frac{ER_{t-1}}{BV_{t-1}} - ROE^a_t = \frac{ER_t - ER_{t-1}}{BV_{t-1}}.$$

After rearranging the terms of the above equation, one can obtain Equation (3):

$$
\begin{aligned}
ROE_t^a &= r \cdot \frac{ER_{t-1}}{BV_{t-1}} - \frac{ER_t - ER_{t-1}}{BV_{t-1}} + ROE_t^{a'} \cdot \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right) \\
&= \frac{(1 + r)ER_{t-1} - ER_t}{BV_{t-1}} + ROE_t^{a'} \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right) \\
&= CAF_t + ROE_t^{a'} \left(1 + \frac{ER_{t-1}}{BV_{t-1}}\right),
\end{aligned}
$$

where $CAF_t = \frac{(1 + r)ER_{t-1} - ER_t}{BV_{t-1}}$, referred to as the conservative accounting factor.

APPENDIX B
Variable Measurement

Variable	Measurement (Compustat item numbers in parentheses)
Panel A: Firm Abnormal ROE	
Firm abnormal ROE	Net income (#237)$_t$/Book value of equity (#60)$_{t-1}$ − cost of equity$_t$
Firm differential abnormal ROE	Firm abnormal ROE − industry abnormal ROE
Panel B: Firm Market-to-Book Ratio	
Market-to-book ratio	(Market value four months after fiscal-year-ends)$_t$/(Book value of equity)$_t$
Panel C: Firm Characteristics—Economic Rent Proxies	
Market share	Sales (#12)$_t$/[Σ(Sales)$_t$ over the industry]
Firm size	Log(Assets (#6)$_t$)
Barriers to entry	
R&D intensity	R&D expenditures (#46)$_t$/Sales$_t$
Advertising intensity	Advertising expenditures (#45)$_t$/Sales$_t$
Capital intensity	Depreciation, depletion, and amortization expenses (#14)$_t$/Sales$_t$

Panel D: Firm Characteristics—Conservative Accounting Factors

Conservative accounting factors are calculated as:

[(1 + cost of equity$_t$)(estimated reserve)$_{t-1}$ − (estimated reserve)$_t$]/(Book value of equity)$_{t-1}$.

Two conservative accounting factors are calculated and the estimated reserve for each factor is calculated as follows:

Estimated reserve—R&D	The unamortized portion of R&D assets generated by current and past R&D expenditures if these expenditures were capitalized. R&D assets are amortized using the coefficients reported in Lev and Sougiannis (1996). To reduce data restriction, the amortization period is chosen to be five years and the coefficients are adjusted proportionally such that they add up to 1. Coefficients for "other industries" are used for an industry, unless coefficients for the industry are reported by Lev and Sougiannis.

Variable	Measurement (Compustat item numbers in parentheses)
Estimated reserve—Advertising	The unamortized portion of advertising assets generated by current and past advertising expenditures if these expenditures were capitalized. As in Penman and Zhang (2002), advertising assets are amortized using an accelerated method (i.e., sum-of-year digits over two years).
Panel E: Firm Characteristics—Other Factors	
Special items	|Special items (#17)$_t$|/(Book value of equity)$_{t-1}$
Total accruals	|Total accruals (#18-#308)$_t$|/(Book value of equity)$_{t-1}$[a]
Magnitude of firm differential abnormal ROE	|Firm differential abnormal ROE|

Panel F: Industry Variable Measurement

Industry measures, except the Herfindahl Index and the magnitude of industry abnormal ROE, are weighted averages of accompanying firm measures. The weight used for each measure is specified below:

Industry abnormal ROE	Beginning-of-period book value of equity is the weight.
Market-to-book ratio	Book value of equity is the weight.
Barriers to entry	Sales is the weight.
Conservative accounting factors	Beginning-of-period book value of equity is the weight.
Special items and total accruals	Beginning-of-period book value of equity is the weight.
Herfindahl Index	Sum of squared market shares in the industry.
Magnitude of industry abnormal ROE	|Industry abnormal ROE|

---

[a] If operating cash flows (#308) is missing or unavailable (prior to 1987), it is estimated as: funds from operations (#110) − change in current assets (#4) + change in current liabilities (#5) + change in cash and cash equivalents (#1) − change in current portion of long-term debt (#34). Current portion of long-term debt is set to be zero if it is reported as missing in the Compustat.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 113–136

The Pricing of National and City-Specific Reputations for Industry Expertise in the U.S. Audit Market

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ABSTRACT: The pricing of Big 5 industry leadership in the U.S. audit market is investigated using audit fee disclosures for the 2000–2001 fiscal years and the joint national-city framework in Ferguson et al. (2003). There is a significant fee premium of 19 percent on those engagements where Big 5 auditors are both the nationally top-ranked auditor and the city-level industry leader in the city where the client is headquartered, indicating that national and city-specific industry leadership *jointly* affect auditor reputation and pricing. However, there is *never* a premium in any tests for auditors that are national industry leaders alone without also being city-specific industry leaders, indicating that national leadership by itself does not result in a premium. The evidence is mixed with respect to city-specific industry leaders alone that are not also national industry leaders. While there is a premium of 8 percent in the primary tests, this result is inconclusive as it does not hold in all sensitivity analyses.

Keywords: *auditor industry expertise; Big 5 accounting firms; audit fees.*

Data Availability: *Data are publicly available.*

I. INTRODUCTION AND BACKGROUND

The purpose of this study is to examine the pricing of Big 5 industry expertise in the United States based on the joint national and city research framework in Ferguson et al. (2003). It is the first large-sample study of industry pricing in the U.S. and uses newly mandated audit fee disclosures beginning with 2000 fiscal-year data.[1] Two

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[1] The fee data in our study are from the 2000 and 2001 fiscal years and pre-date the collapse of Arthur Andersen in 2002. For this reason the term "Big 5" is used in the paper and refers to the U.S. practices of the following international accounting firms: Arthur Andersen, Deloitte Touche, Ernst & Young, KPMG, and PricewaterhouseCoopers.

We thank the two anonymous referees for their insightful and helpful comments on the paper.

Editor's note: This paper was accepted by Terry Shevlin, Senior Editor.

Submitted December 2003
Accepted July 2004

research questions are investigated. First, is there evidence that Big 5 auditor industry expertise is priced in the U.S. audit market? Second, does the audit market price a Big 5 firm's national (firm-wide) reputation or city-specific (local-office) reputation for industry expertise? The appropriate definition and measurement of auditor industry expertise is an important but unresolved issue in auditing research (Hogan and Jeter 1999; Solomon et al. 1999; Gramling and Stone 2001; Krishnan 2001; Ferguson et al. 2003). Our study contributes to resolving this issue by examining audit fees to determine if the pricing of industry expertise in the U.S. audit market is based on a firm's national reputation (measured using total U.S. clientele), or alternatively local-office reputations (measured using city-specific clienteles).

Industry knowledge and expertise in auditing derives from the firm's human capital investments in accounting professionals and their experiences in servicing clients primarily out of city-based practice offices (Ferguson et al. 2003; Solomon et al. 1999). The central issue in the "national" versus "city" perspective on industry expertise is the degree to which office-specific expertise is transferable throughout the firm's network of practice offices and therefore the degree to which the reputation for industry expertise is local (office-specific) or firm wide. In other words, can a Big 5 firm "capture" the industry expertise of its office-based accounting professionals and distribute it to other offices in the firm's network, thus achieving a firm-wide reputation for industry expertise beyond specific offices where experts work and serve clients?[2] The argument for the "national" perspective assumes that accounting firms capture industry expertise through knowledge-sharing practices such as internal benchmarking of best practices, the use of standardized industry-tailored audit programs, and extending the "reach" of professionals from their primary local-office clientele to other clients through travel and internal consultative practices. The alternative viewpoint is that auditor expertise is indelibly tied to individual professionals and their deep personal knowledge of clients, and therefore cannot be readily captured and distributed by the firm to other offices and clients. Similar arguments have been made about human capital and client-specific expertise in law firms (Gilson and Mnookin 1985). The transferability of expertise implicit in the national perspective would be evidenced if national (firm-wide) reputation is priced by the audit market, but would not be supported if it turns out that only local office (city specific) reputation is priced.

Our study consistently shows across all tests that auditor reputation for industry expertise is neither strictly national nor strictly local in character. Rather, the evidence indicates that an auditor's reputation for industry expertise is priced when the firm is *jointly* the national industry leader and the city-specific industry leader where the client is headquartered. This is evidence that there is transferability of expertise across offices since national leadership does affect the audit fee premium. However, the results do not fully support this argument since auditors do not earn a fee premium on engagements when they are national leaders alone *without* also being the city-specific industry leader. There is also evidence that city-specific industry leadership alone (without also being a national industry leader) may result in a fee premium, although this result does not hold in two of the study's sensitivity analyses and so the evidence is inconclusive on this point.

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[2] Ferguson et al. (2003) use the term ***network externality*** to describe the benefit to a Big 5 firm if office-specific industry expertise can be captured by the firm as a whole and transferred to other offices in the firm's network of practice offices. However, in the economics literature the term network externality (or network effect) is used more narrowly to describe situations in which the value of a good or service to a consumer increases as more people use the good or service. A classic example is a telephone network in which the value of telephone service increases as more people have telephones. In order to avoid any potential confusion over terminology, we use the term *transferability of expertise* in this paper rather than network externalities to explain the firm-wide reputation benefit to a Big 5 firm of capturing office-specific industry expertise and distributing it to other offices in the firm's network.

As discussed in the next section, there are important institutional differences between the U.S. and Australia, and our results contrast with the Australian evidence reported in Ferguson et al. (2003) in several important ways. First we find a premium only for the nationally top-ranked firm, whereas Ferguson et al. (2003) report a premium for each of the two top-ranked firms. In part this may reflect the fact that the top-ranked U.S. firm has such a large market share relative to the second-ranked firm (50 percent versus 22 percent), whereas in Australia the top two firms are closer in market share (28 percent and 24 percent). Second, as noted above, we find some evidence (albeit mixed) of a city-specific reputation effect in the U.S. without also being a national industry leader, whereas Ferguson et al. (2003) find a fee premium only for *joint* national-city leaders. Finally, compared to Ferguson et al. (2003), we conduct and report a far greater range of sensitivity analyses including alternative industry definitions, alternative measures of auditor industry leadership, and additional estimations to control for differences in company size.

Recent audit research uses "national" clienteles to measure auditor industry expertise and reports evidence of higher-quality audits by industry experts. For example, there is evidence that auditor industry expertise (based on national clienteles) is associated with higher-quality audits as evidenced by smaller abnormal accruals, which implies less earnings management, and a higher market valuation of earnings that suggest greater earnings quality (Balsam et al. 2003; Krishnan 2003). However, studies of audit quality may be even better focused if city-level dimensions are incorporated into the research design (Reynolds and Francis 2000). An example is a recent study by Krishnan (2005) that examines the Houston office of Arthur Andersen and finds that Andersen's Houston-office clients had significantly less conservative financial statements (pre-Enron) than did other Andersen offices or other auditors' Houston offices. The Houston example underscores the potential importance of investigating auditor behavior at the local-office level where engagement responsibility exists and auditor decision making occurs, in additional to the more conventional firm-wide studies (Wallman 1996).

The remainder of the paper is organized as follows. Relevant prior audit fee research is reviewed in the next section. The data and sample are described in Section III, and the research method is presented in Section IV. Results of the primary industry pricing tests are reported in Section V, and robustness and specification checks are reported in Section VI. Section VII concludes the study.

II. PRIOR RESEARCH

There has been limited investigation of U.S. audit pricing due to the lack of publicly available fee data, and prior empirical research on auditor industry expertise has relied primarily on Australian data because audit fees have been publicly disclosed in that country since the early 1970s.[3] Craswell et al. (1995) use Australian data from the mid-1980s and report a premium for Big 5 accounting firms that have larger industry market shares relative to other Big 5 firms. However, Ferguson and Stokes (2002) use the same research design and find that the industry premium documented in Craswell et al. (1995) diminished over time and no longer existed by 1998. Most recently, Ferguson et al. (2003) re-examine the data in Ferguson and Stokes (2002) using a joint national and city framework and find that each of the two top-ranked Big 5 firms in industries (based on national market shares) earn a fee premium. However, they further document that the two top-ranked Big 5 firms earn a premium only for those engagements in which they are also the city-specific industry leader. In other words, it appears that *joint* national and city leadership drives auditor reputation for industry expertise in the pricing of Australian audits.

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[3] DeFond et al. (2000) report evidence of an industry premium in the Hong Kong audit market. There are two U.S. studies that examined specialized industries but found no evidence of an industry specialist premium: Palmrose (1986) examines a sample of public utilities, and Pearson and Trompeter (1994) examine insurance companies. More recently, Casterella et al. (2004) use private survey data from the early 1990s for a broader sample of industries and report evidence of a Big 5 industry-specialist premium, but only for smaller publicly listed companies.

While the evidence in Ferguson et al. (2003) is compelling, the U.S. audit market is qualitatively different than Australia and therefore the results on industry specialization in Australia may not necessarily hold for the United States. The Big 5 accounting firms are more dominant and have a larger percentage of company audits in the U.S. Compustat data indicate the Big 5 audit around 85 percent of U.S. companies, compared to 65 percent in the Australian sample reported in Ferguson et al. (2003). At the city level in Australia, Ferguson et al. (2003) find that non-Big 5 firms are market leaders in 17 of 120 unique city-industry combinations, whereas in our U.S. sample the Big 5 firms are always city-level industry leaders. There are also many more publicly listed companies in the United States (approximately 10,000 U.S. companies in Compustat versus 1,084 Australian-listed companies reported in Ferguson et al. 2003), and more industry sectors in the United States (72 unique two-digit SIC codes in the Compustat population versus 24 stock exchange industry categories in Australia). U.S. companies are also much larger on average than Australian companies. The mean of total assets for companies in our U.S. sample is $1.9 billion, compared to mean assets of $40 million (USD) in Ferguson et al. (2003). Another important difference is that the mining sector in Australia comprises nearly half of its publicly listed companies. Except for the mining sector, there are generally more companies per industry in the United States. Collectively, these differences suggest that Big 5 auditor industry specialization is more plausible in the United States due to more industries, larger companies and larger industry sizes, and larger Big 5 clienteles within industries. In addition, with larger industry sizes the estimation of industry fee premia may be more reliable as well.

There are also important institutional differences between Australia and the United States that could affect audit pricing and that make it difficult to generalize from Australia to the United States. While Australia has broadly similar accounting standards as the United States, it generally has less detailed standards and reporting requirements (for example, there are only half-yearly interim reports rather than quarterly reports); its regulatory body, the Australian Securities and Investments Commission, appears to be less aggressive in policing companies and punishing auditors compared to the Securities and Exchange Commission (for example, there is nothing comparable to the SEC's Accounting and Auditing Enforcement Releases); and litigation is less likely to occur in Australia (Wingate 1997). All of these differences could affect the demand for auditor industry expertise and the pricing of audits.

The U.S. economy and audit market is also quite decentralized relative to Australia. The largest U.S. city in our study is San Francisco with 481 company headquarters and represents 16 percent of the total sample. The second largest city is New York with 428 companies and represents 14 percent of the total sample. In contrast, 84 percent of Australian publicly listed companies are headquartered in just three cities (Melbourne, Perth, and Sydney), and the Big 5 accounting firms have very few offices beyond those in Australia's five state capitals. By contrast, U.S. companies are widely dispersed around the country and the Big 5 accounting firms have from 91 (Deloitte Touche) to 115 (KPMG) separate practice offices based on recent website disclosures. The interplay of national and city-specific auditor reputation therefore is likely to be more complex in the U.S. and affected by the large number of offices, and the variation in offices, both across firms and within individual firms as documented in Francis et al. (1999). Since the Big 5 accounting firms have many more offices in the U.S. compared to just a handful in Australia, it may be more difficult for Big 5 firms in the U.S. to achieve the firm-wide transferability of office-specific industry expertise and, more generally, difficult to achieve a uniform firm-wide reputation across a divergent range of offices. Consistent with greater decentralization and geographical diversity in the U.S. audit market, the national industry leader is the city-specific industry in only 18 percent of the unique city-industry combinations in our U.S. sample, whereas Ferguson et al. (2003) document that the national industry leader is the city-level industry more than twice as often in Australia (44 percent of the unique city-industry combinations).

III. SAMPLE AND DATA

Our sample is restricted to U.S. publicly listed companies with Big 5 auditors and requires financial statement data and auditor fee data for the analysis. Financial statement data are obtained from the Compustat 2000 and 2001 annual research files, and auditor fee data come from annual proxy statements filed with the Securities and Exchange Commission and available electronically from Standard & Poor's and Emerson Research. In terms of Compustat years, the time period covered is the Compustat year 2000 (fiscal year-ends from June 1, 2000 to May 31, 2001) and the Compustat year 2001 (fiscal year-ends from June 1, 2001 to May 31, 2002). Both years are needed to complete the cycle of first-time audit fee disclosures. Fee disclosures began in proxy statements filed on February 5, 2001 for fiscal year-ends in December 2000. This means that companies with fiscal year-ends between June 1, 2000 and November 30, 2000 did not report their initial fee disclosures until the 2001 Compustat fiscal year. We start with 9,898 firm-year observations with Big 5 auditors and having audit fee data from Standard & Poor's (n = 7,695) which is the primary source, supplemented by Emerson Research (n = 2,203).

Table 1 shows the composition of the national and city samples for testing the pricing of Big 5 auditor industry expertise. Both samples meet the following screens: (1) is audited by a Big 5 accounting firm, (2) must have the required financial statement data on Compustat, (3) is not in the financial services sector (SIC codes 6000 to 6999), and (4) audit fees are reported for the first time. For the national sample, we remove 892 firm-year observations having audit fee data from Emerson Research but that could not be matched by CUSIP to the Compustat annual files, and we remove another 688 firm-year observations with missing Compustat data for model variables and/or observations that are foreign-based firms. We exclude 1,957 financial institutions because of their dissimilar nature to other industries. Finally, we limit the sample to first-time audit fee disclosures and thus exclude 2,367 firm-year observations reporting second-year audit fees, resulting in a total of 3,994 unique observations in 63 industries for the national sample.

The city sample is constructed in the same way as the national sample with one additional screen relating to the availability of city location indicators. We define cities using the U.S. Census Bureau definition of metropolitan statistical areas (MSA) to identify metropolitan areas based on state and county codes. As in Francis et al. (1999), the engagement office of the audit firm administering the audit is assumed to be located in the same city as the client's headquarters. Sample observations are assigned a city code based on the

TABLE 1
Sample Selection of Big 5 Audited Companies

	National Sample	City Sample
Big 5 observations with audit fees (2000 and 2001)		
Emerson Research	2,203	2,203
Standard & Poor's	7,695	7,695
Subtotal	9,898	9,898
Less:		
Companies unavailable on Compustat	(892)	(892)
Unmatched city (MSA) codes		(415)
Financial Sector (SIC 6000–6999)	(1,957)	(1,832)
Missing Compustat data or foreign firms	(688)	(585)
Second time reported audit fees	(2,367)	(2,352)
Less than two observations per city/industry		(777)
Final sample sizes	3,994	3,045

location of corporate headquarters as reported in Compustat. We delete 415 firm-year observations with city locales on Compustat that do not match the U.S. Census Bureau MSA codes.[4] Finally, we exclude city-level industry observations in those city-industry combinations in which there are fewer than two companies (777) because of the possibility of measurement error in the auditor city designation as explained in footnote 5, as well as the fact that there is unlikely to be a competitive audit market for city-level industry specialization if there is only one company in the industry for the city.[5]

The final city sample consists of 3,045 unique observations in 52 different industries, located in 77 cities. The overall ten largest cities in terms of total observations per city are: San Francisco (481), New York (428), Boston (255), Los Angeles (216), Dallas-Fort Worth

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[4] Cities are classified by MSA as defined by the U.S. Census Bureau Office of Management and Budget. MSAs are comprised of specific counties, and these counties are denoted by a five-digit number consisting of two digits that indicate the state and the last three digits that indicate the county. For example, the Minneapolis-St. Paul MSA (No. 5120) has 13 distinct county codes in two separate states, Minnesota (11 counties) and Wisconsin (two counties). MSAs are identified for each audit client based on its headquarter county code and state code, available on Compustat, which are then matched to MSA five-digit county-state codes available in electronic format from the U.S. Census Bureau at http://www.census.gov/population/estimates/metro-city/99mfips.txt.

[5] Measurement error in the office designation is unlikely to bias tests in favor of the significant results we find, although it could potentially cause insignificant results. To verify the auditor's engagement office is in the same MSA as the client's headquarters, we randomly sampled 200 observations from the city sample of 3,822 observations (before excluding the 777 observations with only one observation in unique city-industry combinations). To do this we first created ten deciles based on audit fees, and then sampled proportionate to the magnitude of fees in each decile as follows: n = 109 randomly selected from decile one (the largest decile and representing 54 percent of total audit fees); n = 46 randomly selected from deciles two and three (23 percent of total audit fees); n = 21 randomly selected from deciles four and five (11 percent of total audit fees); and n = 24 randomly selected from deciles six through ten (12 percent of total audit fees). We obtained the following results: 22 (11 percent) of the 200 sampled items had the wrong city attributed to the auditor. This error rate is higher than the estimated error rate of 3 percent in Francis et al. (1999). However, 8 of these 22 errors had no impact on the correct identification of the city-level industry leader. So there are only 14 effective errors in the sample, which is an adjusted error rate of 7 percent. Of these 14 errors, a majority (nine) pertain to situations in which there is only one observation in the unique city-industry combination. Based on this we decided to exclude from the sample those city-industry combinations that have only one observation in order to minimize potential measurement error associated with the specification of city-level industry leadership. After we eliminate those city-industry combinations with only one observation, the revised sample error rate is 3.4 percent (i.e., the five remaining errors out of 145 sample observations from city-industry combinations with two or more observations).

(131), Houston (130), Chicago (128), Philadelphia (124), Washington-Baltimore (110), and Minneapolis-St. Paul (107). Within the 77 cities in the sample, there are a total of 481 unique city-industry combinations, and the national industry leader is the city leader in 18 percent of these 481 unique city-industry combinations. On average there are six observations per unique city-industry combination.

The measurement of Big 5 auditor industry leadership is based on each Big 5 firm's share of audit fees in industry groupings based on two-digit SIC codes, and industry expertise is assumed to be increasing in market share (Ferguson et al. 2003; Hogan and Jeter 1999).[6] Big 5 auditors are ranked from one to five based on their percentage of fees in the industry.[7] National reputation is measured using national market share rankings based on the full sample of 3,994 observations, and city-specific reputation is measured using city-specific clienteles. Table 2 summarizes the national Big 5 rankings for all 63 industries in the study. Averaged across all 63 industries, the Big 5 market shares are as follows: the top-ranked Big 5 firm has an average market share of 50 percent, the second-ranked firm has a market share of 22 percent, the third-ranked firm a market share of 14 percent, the fourth-ranked firm a market share of nine percent, and the fifth-ranked firm a market share of five percent. Leadership in the 63 industries is distributed as follows: Arthur Andersen (AA) is the national leader in 14 industries; Deloitte Touche (DT) is the national leader in 5 industries; Ernst & Young (EY) is the national leader in 15 industries; KPMG (KP) is the national leader in 9 industries; and PricewaterhouseCoopers (PW) is the national leader in 20 industries. There are no industries in which a non-Big 5 firm is industry leader.

City-specific reputations for Big 5 auditor industry expertise are measured for each industry in each city based on city-specific industry market shares. Big 5 auditors are ranked from one to five based on their percentages of fees in an industry for each particular city. Averaged across all 481 unique city-industry combinations, the top-ranked firm has an average city-level industry market share of 69 percent and the second-ranked firm has a 23 percent market share. City-level industry leadership in these 481 unique city-industry combinations is distributed among the Big 5 firms as follows: AA (105), DT (79), EY (105), KP (69), and PW (123).

It can be seen from the above data that each of the Big 5 firms is well represented in the distribution of industry leadership in both the national and city samples. Thus there is no concern that industry leadership might be a proxy for firm-specific reputations rather than the reputation effects of industry leadership. In addition, as a sensitivity analysis reported in Section VI, we drop each accounting firm one at a time and the results are qualitatively unchanged, which indicates that individual accounting firms do not drive the results.

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[6] Audit fees are the only observable measure of output in the auditing industry. In our sample, the top-ranked firm nationally averages 50 percent of industry fees across all industries, compared to an average of only 22 percent for the second-ranked firm. Absent other information, it seems reasonable that dominant firms (industry leaders) are most likely to have a reputation for industry expertise to the extent that such reputations exist and matter in the audit market. It is possible of course that other firms (beside the top-ranked firm) have a reputation for industry expertise, but if this were true, then measurement error would bias against finding results for industry leaders.

[7] Earlier studies use arbitrary market share percentages such as 10 or 15 percent to denote auditor industry specialists (Craswell et al. 1995; Ferguson and Stokes 2002). However, there is no way of knowing the level of market share that might distinguish between one firm being perceived to be a specialist while another firm is not. The advantage of using rankings is that we do not have to arbitrarily specify what these market shares are. It turns out that four industries have identical percentages rounded to nearest whole (SIC codes 32, 50, 57, and 99). We denote the firm with the largest absolute percentage as the top-ranked firm in Table 2. However, as sensitive analysis we code both the first- and second-ranked firm as industry leaders in these four industries, and these results are qualitatively the same as those reported in Table 4.

TABLE 2
Big 5 Industry Market Shares for National Sample (n = 3,994)

				Percentage Distribution of Big 5 Audit Fees[a]									
SIC Two-Digit Code	Industry Name	n	Total Big 5 Fees ($mil)	Top-Ranked Firm		Second-Ranked Firm		Third-Ranked Firm		Fourth-Ranked Firm		Fifth-Ranked Firm	
1	Agricultural production—crops	12	4.449	AA	40%	PW	27%	EY	22%	DT	9%	KP	2%
2	Agricultural production—livestock	1	0.068	EY	100								
7	Agricultural services	5	1.230	AA	60	EY	14	PW	14	DT	11		
9	Fishing, hunting, and trapping	1	0.226	EY	100								
10	Metal mining	12	3.675	PW	45	AA	42	EY	8	KP	3	DT	2
12	Coal mining	5	1.947	EY	91	KP	9						
13	Oil and gas extraction	123	45.826	AA	47	PW	30	KP	12	DT	6	EY	6
14	Nonmetallic minerals, except fuels	9	2.982	EY	37	AA	32	DT	24	KP	5	PW	2
15	General building contractors	4	0.683	EY	49	AA	37	KP	14				
16	Heavy construction contractors	11	5.329	EY	57	AA	21	PW	11	DT	9	KP	1
17	Special trade contractors	13	4.840	AA	62	KP	19	DT	10	PW	7	EY	2
20	Food and kindred products	79	71.153	PW	33	EY	24	KP	16	AA	14	DT	12
21	Tobacco manufactures	3	3.479	KP	54	PW	25	EY	21				
22	Textile mill products	16	7.645	EY	36	AA	26	PW	14	DT	13	KP	11
23	Apparel and other textile products	35	12.634	DT	45	EY	26	PW	15	AA	13	KP	1
24	Lumber and wood products	20	7.915	PW	42	AA	33	DT	15	EY	7	KP	3
25	Furniture and fixtures	24	12.055	AA	44	PW	27	DT	13	KP	9	EY	7
26	Paper and allied products	42	41.666	PW	33	AA	27	DT	15	KP	13	EY	12
27	Printing and publishing	55	30.645	EY	26	DT	22	KP	20	PW	18	AA	14
28	Chemicals and allied products	364	178.266	PW	36	DT	19	AA	19	KP	14	EY	12
29	Petroleum and coal products	17	40.009	PW	73	EY	15	AA	8	DT	3	KP	1
30	Rubber and miscellaneous plastics products	49	29.439	PW	42	EY	28	AA	18	KP	10	DT	3
31	Leather and leather products	16	5.327	KP	29	EY	27	DT	26	PW	11	AA	8
32	Stone, clay, glass, and concrete products	25	11.014	AA#	34	EY	34	PW	22	DT	8	KP	2

(*continued on next page*)

TABLE 2 (continued)

33	Primary metal industries	64	35.957	PW	54%	EY	21%	DT	13%	AA	10%	KP	2%
34	Fabricated metal products	64	34.382	PW	45	AA	18	KP	16	EY	16	DT	5
35	Industrial machinery and equipment	271	153.288	PW	32	EY	23	KP	20	AA	15	DT	9
36	Electrical and electronic equipment	359	141.395	PW	29	EY	26	KP	23	DT	12	AA	10
37	Transportation equipment	75	85.455	DT	31	PW	30	EY	23	AA	14	KP	2
38	Instruments and related products	297	89.471	PW	40	EY	21	AA	18	DT	11	KP	11
39	Miscellaneous manufacturing industries	32	13.091	PW	31	KP	21	AA	20	DT	18	EY	10
40	Railroad transportation	11	7.661	EY	31	DT	26	KP	20	PW	17	AA	7
42	Motor freight transportation and warehousing	32	7.691	AA	46%	EY	20%	KP	16%	DT	15%	PW	3%
44	Water transportation	14	4.256	EY	32	PW	27	DT	21	AA	12	KP	8
45	Transportation by air	32	16.443	AA	52	EY	28	KP	11	DT	9		
46	Pipelines, except natural gas	1	0.400	KP	100								
47	Transportation services	14	5.157	KP	41	PW	26	AA	22	EY	7	DT	4
48	Communications	149	103.877	PW	31	EY	30	AA	23	DT	9	KP	7
49	Electric, gas, and sanitary services	135	161.567	AA	55	DT	23	PW	16	EY	5	KP	2
50	Wholesale trade—durable goods	104	40.970	AA#	24	EY	24	PW	23	KP	19	DT	10
51	Wholesale trade—nondurable goods	63	58.812	AA	61	DT	14	EY	13	KP	7	PW	5
52	Building materials, hardware, garden supply, etc.	11	3.759	KP	43	EY	26	PW	23	DT	7		
53	General merchandise stores	30	24.368	KP	26	EY	25	DT	22	AA	17	PW	11
54	Food stores	21	9.741	DT	48	PW	32	KP	7	AA	6	EY	6
55	Automotive dealers and gasoline service stations	20	7.239	AA	44	DT	24	KP	14	PW	10	EY	8
56	Apparel and accessory stores	50	14.418	PW	31	DT	30	KP	20	AA	10	EY	9
57	Furniture, home furnishings, and equipment stores	20	4.847	EY#	29	DT	29	KP	26	PW	14	AA	3
58	Eating and drinking places	68	17.947	KP	31	EY	24	AA	23	DT	12	PW	11
59	Miscellaneous retail	92	38.010	DT	43	EY	20	AA	16	PW	12	KP	9
70	Hotels, rooming houses, camps, etc.	18	8.672	AA	80	PW	10	EY	5	KP	4	DT	2
72	Personal services	13	6.151	PW	79	AA	16	KP	4				
73	Business services	714	246.199	PW	32	KP	19	EY	19	AA	17	DT	13
75	Automotive repair, services, and parking	5	2.988	KP	94	AA	4	PW	2				
76	Miscellaneous repair services	2	0.174	DT	83	AA	17						

(continued on next page)

TABLE 2 (continued)

				Percentage Distribution of Big 5 Audit Fees[a]									
SIC Two-Digit Code	**Industry Name**	**n**	**Total Big 5 Fees ($mil)**	**Top-Ranked Firm**		**Second-Ranked Firm**		**Third-Ranked Firm**		**Fourth-Ranked Firm**		**Fifth-Ranked Firm**	
78	Motion pictures	11	10.951	EY	78	PW	14	KP	3	DT	3	AA	1
79	Amusement and recreational services	41	12.516	AA	48	DT	23	EY	11	PW	10	KP	9
80	Health services	74	26.150	EY	40	KP	24	AA	16	DT	11	PW	9
81	Legal services	1	0.111	EY	100								
82	Educational services	16	4.873	EY	30	AA	29	KP	20	PW	19	DT	2
83	Social services	13	2.983	KP	64	EY	15	AA	13	PW	8		
86	Membership organizations	1	0.121	PW	100								
87	Engineering and management services	111	29.941	PW	31	AA	20	KP	19	EY	15	DT	14
99	Unclassified	4	1.942	PW#	37	DT	37	AA	16	EY	10		
Total (mean market share percentages across all industries)		**3,994**	**$1,956.475**		**50%**		**22%**		**14%**		**9%**		**5%**

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[a] Big 5 accounting firms abbreviations: AA = Arthur Andersen; DT = Deloitte Touche; EY = Ernst & Young; KP = KPMG; and PWC = PricewaterhouseCoopers. In four industries, the top-two firms round to the same whole percentage, but # denotes the firm with the larger absolute share. Sensitivity analysis using both firms as co-industry leaders results in qualitatively the same inferences.

IV. RESEARCH METHOD

A cross-sectional OLS audit fee regression model is used similar to that in Ferguson et al. (2003). Audit fee regression models use a set of variables to control for general cross-sectional differences in factors that affect fees, plus additional test variables of interest (Simunic 1980). In prior studies, these models have good explanatory power (adjusted R^2s of 0.70 and higher) and have been robust across different samples, time periods, countries, and sensitivity analyses for model misspecification (Francis and Simon 1987; Chan et al. 1993).

The auditor indicator variables test the effect of Big 5 industry expertise on audit pricing. The comparison group consists of observations audited by other (nonleader) Big 5 auditors, and the research design tests for differential audit fees through a cross-sectional comparison of audit fees of industry leaders with other accounting firms, after controlling for general factors affecting fees. Formally, the test determines if there is a significant positive intercept shift (higher fees) in the fitted regression model.

An innovation in our study is the use of an industry fixed-effects model with industry indicator variables defined at the two-digit SIC level to control for general industry-wide effects on audit pricing. Prior audit research has not controlled for average (intercept) differences in fees across industries.[8] All of the reported t-statistics in the study are two-tailed p-values and are corrected for heteroscedasticity (White 1980).

The following regression model is the study's primary audit fee model and uses a joint national-city framework to test three separate experimental auditor variables: an indicator variable that is coded 1 when the auditor is *both* national industry leader and city-specific industry leader where the client is headquartered; an indicator variable coded 1 if the auditor is the national industry leader (but not the city leader); and an indicator variable coded 1 when the auditor is the city industry leader (but not the national leader). The default comparison group is all nonleaders. The purpose of this model is to tease out if it is national reputation alone, city reputation alone, or joint national-city reputation that matters in the pricing of auditor industry expertise. For completeness and as a sensitivity analysis, we also estimate separate restrictive models using national industry leadership (alone) and city-specific industry leadership (alone) to measure auditor industry expertise.

The OLS regression model is specified as follows in Equation (1):

$$\begin{aligned} LAF = {} & b_0 + b_1 LTA + b_2 LSEG + b_3 CATA + b_4 QUICK + b_5 DE + b_6 ROI \\ & + b_7 FOREIGN + b_8 OPINION + b_9 YE + b_{10} LOSS \\ & + b_{11} JOINT\text{-}LEADER + b_{12} NATIONAL\text{-}ONLY + b_{13} CITY\text{-}ONLY \\ & + \textit{fixed effects} + e \end{aligned} \tag{1}$$

where:

LAF = natural log of audit fees in dollars;
LTA = natural log of total assets in millions of dollars;
LSEG = natural log of the number of unique business segments;
CATA = ratio of current assets to total assets;

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[8] Adjusted R^2s increase by approximately 1.5 percent when adding the set of industry indicator variables, and most of the industry variables are significantly different from the default industry variable. Statistical inference on the auditor test variables are qualitatively unchanged using industry fixed effects, though for significant (insignificant) auditor variables the coefficients and t-statistics are slightly larger (smaller) relative to estimations without industry variables.

QUICK = ratio of current assets (less inventories) to current liabilities;
DE = ratio of long-term debt to total assets;
ROI = ratio of earnings before interest and tax to total assets;
FOREIGN = proportion of total sales from foreign operations;
OPINION = indicator variable, 1 = qualified audit report;
YE = indicator variable, 1 = non-Dec. 31 year-end;
LOSS = indicator variable, 1 = loss in current fiscal year;
JOINT-LEADER = indicator variable for auditors that are *both* national industry leaders and city-specific industry leaders where clients are headquartered;
NATIONAL-ONLY = indicator variable for auditors that are national industry leaders but *not* the city-specific industry leaders where clients are headquartered;
CITY-ONLY = indicator variable for auditors that are *not* national industry leaders but are the city-specific industry leaders where clients are headquartered;
Fixed effects = industry dummy variables for two-digit SIC industry classifications; and
e = error term.

The above model is identical to Ferguson et al. (2003) except for two variables, *LSEG* and *FOREIGN*. The number of business segments (*LSEG*) is used rather than the number of subsidiaries to measures business complexity because subsidiary data is not available for U.S. companies on Compustat. For the same reason, the variable *FOREIGN* is measured using the proportion of total sales that are from foreign operations, rather than the proportion of subsidiaries that are foreign subsidiaries. As in prior studies transformations are made to normalize some variables (*LAF, LTA,* and *LSEG*).

With respect to the ten control variables in the model, higher fees are expected (positive coefficients) for larger clients (*LTA*), for greater audit complexity (*LSEG* and *FOREIGN*), and for greater audit risk (*CATA, DE,* and *LOSS*). A positive coefficient is also expected for *OPINION* as prior studies document higher fees associated with modified opinions, possibly due to more investigative efforts in such circumstances. Negative coefficients are expected for the variables *QUICK, ROI,* and *YE*. *QUICK* is an audit risk variable and clients with a smaller quick ratio are riskier (less liquid) and therefore are expected to have higher audit fees. Prior studies find that clients with higher *ROI* have lower fees, which is consistent with auditor-client risk sharing, i.e., more profitable clients pose less risk to the auditor resulting in lower fees. Finally, clients with off-peak non-December 31st fiscal year-ends (*YE*) are expected to have lower fees. Descriptive statistics are reported in Table 3 for the national sample (n = 3,994) and city sample (n = 3,045). The two samples are comparable and only three variables are significantly different at $p < .01$: firms in the city sample have a larger mean for current assets (*CATA*), a smaller mean for long-term debt (*DE*), and a larger percentage of firms reporting losses (*LOSS*).

V. TESTS OF INDUSTRY EXPERTISE

Results of three model estimations are reported in Table 4. Models 1 and 2 are restrictive models using only a national-level auditor variable and a city-level auditor variable, respectively, and model 3 is the estimation of Equation (1) using the joint national-city framework. All three models are significant at $p < .001$ with adjusted R^2s of 0.74. The control variables are significant at $p < .05$ (two-tailed tests) in the expected direction, with the exception of *CATA, QUICK, DE,* and, *YE* (though *DE* is significant in model 1). Results

TABLE 3
Descriptive Statistics for the 2000–2001 Sample Data

Variables	National Sample (n = 3,994)					City Sample (n = 3,045)				
	Mean	Median	Std. Dev.	Q1	Q3	Mean	Median	Std. Dev.	Q1	Q3
Fees ($)	489,854	200,000	1,267,575	115,000	423,000	502,318	196,100	1,388,468	114,200	413,645
LAF	12.380	12.206	1.039	11.653	12.955	12.369	12.186	1.050	11.646	12.933
Assets ($millions)	1,912	218	8,052	66	845	1,944	193	8,795	59	745
LTA	5.527	5.387	1.927	4.189	6.739	5.432	5.262	1.937	4.079	6.613
SEG	2.111	1.000	1.545	1.000	3.000	2.048	1.000	1.533	1.000	3.000
LSEG	0.522	0	0.643	0	1.099	0.490	0	0.639	0.000	1.099
CATA	0.518	0.520	0.252	0.314	0.723	0.544	0.554	0.253	0.342	0.754
QUICK	3.065	1.460	12.534	0.848	2.833	3.515	1.649	14.281	0.953	3.201
DE	0.179	0.095	0.230	0.001	0.296	0.161	0.057	0.218	0	0.268
ROI	−0.065	0.050	0.453	−0.104	0.111	−0.088	0.039	0.468	−0.151	0.108
Foreign	0.142	0	0.223	0	0.241	0.153	0	0.228	0	0.268
Opinion	0.173	0	0.379	0	0	0.171	0	0.376	0	0
YE	0.319	0	0.466	0	1	0.305	0	0.461	0	1
Loss	0.441	0	0.497	0	1	0.473	0	0.499	0	1

Variable Definitions:
Fees = audit fees (dollars);
LAF = natural log of audit fees;
Assets = total assets (millions of dollars);
LTA = natural log of total assets;
SEG = number of business segments;
LSEG = natural log of business segments (*SEG*);
CATA = ratio of current assets to total assets,
QUICK = ratio of current assets (less inventories) to current liabilities;
DE = ratio of long-term debt to total assets;
ROI = ratio of earnings before interest and tax to total assets;
Foreign = proportion of foreign sales;
Opinion = indicator variable, 1 = qualified audit report;
YE = indicator variable, 1 = non-December 31st year-end; and
Loss = indicator variable, 1 = loss in current fiscal year.

TABLE 4
Big 5 Audit Fee Models for National, City, and Combined Analysis[a]
(Dependent variable is natural log of audit fees)

		National Industry Leadership Model 1			City Industry Leadership Model 2			Combined National and City Model Model 3		
Control Variables	**Exp. Sign**	**Estimate**	**t-statistic**	**Prob.**	**Estimate**	**t-statistic**	**Prob.**	**Estimate**	**t-statistic**	**Prob.**
Intercept		9.901	38.505	<0.001	10.335	102.606	<0.001	10.366	92.532	<0.001
LTA	+	0.434	63.395	<0.001	0.420	52.385	<0.001	0.419	52.474	<0.001
LSEG	+	0.213	14.604	<0.001	0.233	13.692	<0.001	0.234	13.763	<0.001
CATA	+	0.070	1.175	0.240	0.024	0.369	0.712	0.023	0.350	0.726
Quick	−	−0.005	−1.398	0.162	−0.004	−1.388	0.165	−0.004	−1.392	0.164
DE	+	0.102	2.302	0.021	0.077	1.257	0.209	0.082	1.339	0.181
ROI	−	−0.200	−4.944	<0.001	−0.222	−4.361	<0.001	−0.219	−4.362	<0.001
Foreign	+	0.622	13.959	<0.001	0.629	12.877	<0.001	0.626	12.784	<0.001
Opinion	+	0.201	8.094	<0.001	0.166	5.741	<0.001	0.165	5.719	<0.001
YE	−	−0.032	−1.720	0.086	−0.003	−0.163	0.871	−0.005	−0.226	0.821
Loss	+	0.064	2.724	0.006	0.020	0.708	0.479	0.019	0.687	0.492
Experimental Variables										
National Leader (Top Firm)		0.075	3.935	<0.001						
City Leader (Top Firm)					0.121	6.039	<0.001			
Both *National Leader* and *City Leader*								0.170	6.012	<0.001
National Leader but *not City Leader*								−0.032	−0.998	0.318
City Leader but *not National Leader*								0.074	3.051	0.002
F-statistic (p-value)			156 (<0.001)			142 (<0.001)			138 (<0.001)	
Adjusted R^2			0.739			0.742			0.742	
Sample size			3,994			3,045			3,045	

(*continued on next page*)

TABLE 4 (continued)

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[a] Sample is Big 5 audited companies with audit fees reported by the client for the first time in 2000 or 2001. Model 2 and model 3 samples are restricted at the city level to a minimum of two observations per industry. Industry fixed effects variables are not reported for brevity. All t-statistics are two-tailed p-values and based on the White (1980) heteroscedasticity corrected covariance matrix.

Control Variables:

LTA = natural log of total assets (in millions);
LSEG = natural log of the number of segments;
CATA = ratio of current assets to total assets;
Quick = ratio of current assets (less inventories) to current liabilities;
DE = ratio of long-term debt to total assets;
ROI = ratio of earnings before interest and tax to total assets;
Foreign = proportion of foreign sales;
Opinion = indicator variable, 1 = qualified audit report;
YE = indicator variable, 1 = non-December 31st year-end; and
Loss = indicator variable, 1 = loss in current fiscal year.

for all three models are comparable when deleting extreme outliers with studentized residual errors greater than +/− 3.[9]

The estimation of model 1 is an iterative process, starting with only one indicator variable for the nationally top-ranked firm in the first estimation, and then adding a second indicator variable for the second-ranked firm in the second estimation, and so on until the introduction of an additional ranking variable is not statistically significant. This iterative process results in only the nationally top-ranked Big 5 firm having a significant fee premium relative to the remaining Big 5 firms. When the second-ranked firm is added as a second indicator variable the coefficient is insignificant at $p > .10$ and the coefficient is close to 0. This result is consistent with the dominant market share of the top-ranked firm nationally (50 percent) relative to the second-ranked firm (22 percent). Thus the results for model 1 reported in Table 4 use a single auditor indicator variable that takes on the value of 1 if an auditor is the nationally top-ranked firm in an industry. The coefficient is 0.075, which is significant at $p < .001$, and the average premium of the nationally top-ranked industry leader is 7.78 percent.[10]

The estimation of model 2 follows the same iterative process, starting with the top-ranked firm at the city level in the first estimation, and adding a second indicator variable for the second ranked firm in the second estimation. The results indicate that only the top-ranked firm has a significant fee premium relative to other firms. Fees of the second-ranked firm are insignificant at $p > .10$ and the coefficient is close to 0. Thus the results for model 2 reported in Table 4 use a single auditor indicator variable coded 1 if the auditor is the city-level industry leader. The coefficient for city-level industry leaders is 0.121, which is significant at $p < .001$, and the average premium of the city leader is 12.86 percent. Note that the city leadership premium in model 2 (12.86 percent) exceeds the national leadership premium in model 1 (7.78 percent).

Model 3 is the primary model and tests the joint effect of national and city industry leadership on audit fees. The first experimental variable is coded 1 for 543 observations (18 percent of sample) in which the auditor is *both* national and city leader; the second experimental variable is coded 1 for 293 observations (ten percent of sample) in which the auditor is national industry leader but not the city leader; and the third experimental variable is coded 1 for 703 observations (23 percent of sample) in which the auditor is the city-specific industry leader but not the national leader. The default comparison group is the 1,506 observations (49 percent of sample) in which the auditor is neither national nor city industry leader.

The results of model 3 are as follows. Big 5 firms that are *both* the national industry leader and the city-specific industry leader have significantly higher fees than the default comparison group of firms, which are neither national nor city leaders. The coefficient is 0.170, which is significant at $p < .001$, indicating that fees are 18.53 percent higher on average. The fees of firms that are a national leader but *not* the city leader are not significantly different from the default comparison group (p-value of 0.318). However, firms that are city leaders but *not* national leaders have a coefficient of 0.074, which is significant at p = 0.002, representing a premium of 7.68 percent.

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[9] Deleting these extreme outliers result in the following. In model 1, national leader coefficient is 0.065 ($p = 0.0002$); in model 2 the city leader coefficient is 0.112 ($p < 0.0001$; in model 3 the joint national-city leader coefficient is 0.146 ($p < 0.001$), the city leader (alone) coefficient is 0.079 ($p = 0.0008$), and the national leader (alone) coefficient is −0.024 ($p = 0.4325$).

[10] Using the procedure described in Craswell et al. (1995, 307), the fee premia is calculated as the percentage effect of the intercept shift on the dependent variable (natural log of audit fees), and is defined as $e^z - 1$, where z is the parameter value for auditors who are market leaders. Note that model 1 has 3,994 observations compared to 3,045 used to estimate models 2 and 3. When we restrict model 1 to 3,045 observations, the results are qualitatively the same as those in Table 4. The coefficient on the national leader is 0.073, significant at $p < .001$ and indicating a premium of 7.6 percent (compared to 7.8 percent in Table 4).

In sum, the evidence in Table 4 indicates that national and city reputations jointly affect audit pricing and the premium for industry expertise. The fact that national and city leadership jointly affect audit fees suggest an interplay between city (local-office) and national (firm-wide) reputation, and does provide at least weak evidence there is transferability of expertise and firm-wide reputation benefits. However, the fact that national leadership alone does not result in a fee premium, without also being the city leader, is evidence against the existence of "strong" firm-wide reputation effects arising from the transferability of office-specific expertise. Finally, model 3 provides evidence that city-specific industry leadership alone (without being a national industry leader) results in a fee premium, and our findings differ with Ferguson et al. (2003) on this point because they find a fee premium in the combined model only for firms that are joint national-city leaders. This result suggests that city-specific industry leadership is a sufficient condition for a fee premium, either alone or in conjunction in national leadership. However, since two of the sensitivity analyses reported in Section VI do not find a premium for city-specific industry leadership (alone), the overall evidence is mixed and inconclusive on this point.

Alternative Industry Definitions

The results in Table 4 are based on 63 (nonfinancial sector) industries defined using two-digit SIC codes. We investigate the robustness of these results to three alternative sets of industry definitions that are based on increasingly broader industry categories. Fama and French (1997) re-combine SIC codes to derive a smaller set of 48 industry groupings, 44 of which correspond to our sample that excludes the financial sector; Francis et al. (1999) re-combine SIC codes to derive 27 industry groupings of which 21 correspond to our sample; and Barth et al. (1998) re-combined SIC codes to derive 15 broad industry groupings of which 14 correspond to our sample.

The results in Table 4 for all three models are robust to these alternative industry definitions. For model 1, the national leader in Table 4 has a premium of 7.8 percent. For the alternative industry definitions, the national leader coefficient in model 1 is significant at $p < .01$ in all three estimations, and the premium is 7.5 percent using the Fama and French (1997) industry groupings, 6.0 percent using the Francis et al. (1999) industry groupings, and 4.9 percent using the Barth et al. (1998) industry groupings.

For model 2, the city leader in Table 4 has a premium of 12.86 percent. For the alternative industry definitions, the city leader coefficient in model 2 is significant at $p < .01$ in all three estimations, and the premium is 16.9 percent using the Fama and French (1997) industry groupings, 12 percent using the Francis et al. (1999) industry groupings, and 12.4 percent using the Barth et al. (1998) industry groupings.

For model 3, the joint national-city leader in Table 4 has a premium of 18.53 percent. For the alternative industry definitions, the joint national-city leader coefficient in model 3 is significant at $p < .01$ in all three estimations, and the premium is 21.9 percent using the French and Fama (1997) industry groupings, 17.7 percent using the Francis et al. (1999) industry groupings, and 16.6 percent using the Barth et al. (1998) industry groupings. In Table 4, for model 3 the city leader alone has a premium of 7.68 percent. For the alternative industry definitions, the city leader alone is significant at $p < .01$ in all three estimations, and the premium is 11.9 percent using the Fama and French (1997) industry groupings, 7.5 percent using the Francis et al. (1999) industry groupings, and 9.1 percent using the Barth et al. (1998) industry groupings. Finally, in Table 4 the national leader alone is insignificant at $p > .10$, and this is also the case for all three of the alternative industry definitions. We conclude that the results in Table 4 are robust to alternative industry groupings.

VI. OTHER ROBUSTNESS TESTS AND SPECIFICATION CHECKS

Model specification checks and other sensitivity analyses are reported in this section to examine the robustness of the study's primary results reported in Table 4. The results in Table 4 are supported in all of the tests except two sensitivity analyses pertaining to model 3 with respect to the premium for city-specific industry leaders that are not (also) national industry leaders.

Alternative Measure of Auditor Industry Leadership

We use first-time disclosures of actual audit fees in 2000 and 2001 to measure auditor industry shares and derive the top-ranked auditor per industry. However, actual audit fees were not publicly reported until proxy statement disclosures which began on February 5, 2001. This begs the question of how audit market participants in 2000 and 2001 would know the identity of industry audit fee leaders prior to the public disclosures. Since audit fees are positively correlated with auditee (client) size, it seems plausible that market participants could infer auditor industry leadership by observing auditor clienteles.

As a robustness check to our use of actual first-time audit fee disclosures to measure auditor industry leadership, we use prior-year client sales to estimate auditor industry market shares and leadership.[11] Models 1, 2, and 3 (from Table 4) are reported in Table 5 using this alternative estimation of industry leadership in lieu of the fee-based measures in Table 4.

The results of re-estimating the three models in Table 4 are robust to this alternative measurement of industry leadership except for one result in model 3 as noted below. For the re-estimation of model 1, the national leader coefficient is significant at $p < .01$ with a premium of 5.2 percent, and for model 2 the city leader coefficient is significant at $p < .01$ with premium of 5.8 percent, although these amounts are smaller than the corresponding fee premia of 7.8 percent and 12.9 percent in Table 4. For the re-estimation of model 3 the joint national-city leader coefficient is significant at $p < .01$ with a premium of 12.0 percent, although again this is lower than the premium of 18.5 percent in Table 4. Finally, both the city leader alone and the national leader alone are insignificant at $p > .10$ in the re-estimation. In contrast, in Table 4 the city leader alone in model 3 has a significant premium of 7.7 percent. We also used prior-year client assets to calculate auditor industry shares, and the coefficients and t-statistics on the auditor test variables are comparable to the above results using prior-year client sales, including insignificance of the coefficient for city leader (alone) in model 3.

Multiple Auditor Offices in a City

Big 5 accounting firms may have more than one practice office in metropolitan areas (cities) defined by MSA codes. If this is the case, there is a possible measurement error in office-level clienteles. Specifically we do not know if multiple offices within a single MSA are autonomous or if they are viewed as branches of one overarching office. To control for

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[11] In addition, a referee points out that since audit fees are used as the study's dependent variable, and audit fees are also used to determine industry leadership, it is possible that coefficients on the auditor variables in Table 4 are upwardly biased if industry leadership is measured with error that is also correlated with audit fees. While there is no way of knowing if this is the case, the use of client sales to measure industry leadership avoids this econometric concern.

TABLE 5
Big 5 Audit Fee Models Where Industry Leadership Is Based on Clients' Prior Year Sales Revenue[a]
(Dependent variable is natural log of audit fees)

		National Industry Leadership Model 1			City Industry Leadership Model 2			Combined National and City Model Model 3		
Control Variables	**Exp. Sign**	**Estimate**	**t-statistic**	**Prob.**	**Estimate**	**t-statistic**	**Prob.**	**Estimate**	**t-statistic**	**Prob.**
Intercept		9.916	37.048	<0.001	10.362	89.912	<0.001	10.399	82.534	<0.001
LTA	+	0.433	60.989	<0.001	0.422	50.938	<0.001	0.421	50.573	<0.001
LSEG	+	0.215	14.484	<0.001	0.236	13.601	<0.001	0.239	13.732	<0.001
CATA	+	0.062	1.020	0.308	0.026	0.377	0.706	0.015	0.215	0.830
Quick	−	−0.005	−1.399	0.162	−0.004	−1.405	0.160	−0.004	−1.404	0.160
DE	+	0.107	2.392	0.017	0.090	1.449	0.147	0.088	1.416	0.157
ROI	−	−0.192	−4.887	<0.001	−0.215	−4.166	<0.001	−0.214	−4.172	<0.001
Foreign	+	0.628	13.769	<0.001	0.616	12.361	<0.001	0.613	12.337	<0.001
Opinion	+	0.199	7.837	<0.001	0.175	5.817	<0.001	0.173	5.765	<0.001
YE	−	−0.040	−2.077	0.038	−0.014	−0.631	0.528	−0.015	−0.699	0.485
Loss	+	0.067	2.835	0.005	0.022	0.757	0.449	0.021	0.722	0.470
Experimental Variables										
National Leader (Top Firm)		0.051	2.573	0.010						
City Leader (Top Firm)					0.056	2.641	0.008			
Both *National Leader* and *City Leader*								0.113	3.789	<0.001
National Leader but *not City Leader*								−0.011	−0.515	0.607
City Leader but *not National Leader*								0.013	0.338	0.735
F-statistic (p-value)			151 (<0.001)			133 (<0.001)			129 (<0.001)	
Adjusted R^2			0.738			0.738			0.738	
Sample size			3,838			2,902			2,902	

(*continued on next page*)

TABLE 5 (continued)

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[a] Sample is Big 5 audited companies with audit fees reported by the client for the first time in 2000 or 2001. Industry leadership is defined as the top-ranked Big 5 firm based share of clients' prior year sales revenue within an industry (two-digit SIC). National industry leadership is based on national industry shares while city industry leadership is based on city-specific industry shares. Model 2 and model 3 samples are restricted at the city level to a minimum of two observations per industry. Industry fixed effects variables are not reported for brevity. All t-statistics are two-tailed p-values and based on the White (1980) heteroscedasticity corrected covariance matrix.

Control Variables:

LTA = natural log of total assets (in millions);
LSEG = natural log of the number of segments;
CATA = ratio of current assets to total assets;
Quick = ratio of current assets (less inventories) to current liabilities;
DE = ratio of long-term debt to total assets;
ROI = ratio of earnings before interest and tax to total assets;
Foreign = proportion of foreign sales;
Opinion = indicator variable, 1 = qualified audit report;
YE = indicator variable, 1 = non-December 31st year-end; and
Loss = indicator variable, 1 = loss in current fiscal year.

this possible measurement error, we re-estimate the models in Table 4 by deleting observations from potential MSAs with multiple auditor offices. To do this we examined the internet home page of PricewaterhouseCoopers, the largest U.S. accounting firm and the largest firm in our sample with 29 percent of total audit fees, to identify actual locations for their 92 U.S. offices. We identified 11 MSAs having two or more offices, and dropped all observations for all auditors in our sample from these 11 MSAs in order to increase the likelihood that remaining observations are single-office MSAs. This reduces the city sample size from 3,045 to 1,758 and we re-estimate models 2 and 3 using this reduced sample.[12] In model 2, the city leader coefficient is 0.120, the t-statistic p-value is $< .001$, and the premium is 12.7 percent. In model 3, the joint national-city leader coefficient is 0.191, the t-statistic is significant at $p = .001$, and the premium is 21.1 percent. The coefficient for the city leader (but not national leader) is 0.063, the t-statistic is significant at $p = .046$, and the premium is 6.5 percent. Finally, the national leader (but not city leader) is insignificant at $p > .10$. These results are comparable to those reported in Table 4 using the full sample, and indicate the full-sample results are robust to treating multiple offices within a MSA as if they are a single office.

Individual Auditors and Industries

To assure the results are not driven by individual accounting firms, the models in Table 4 are re-estimated dropping each of the accounting firms one at a time. For models 1, 2, and 3 the auditor coefficients that are significant in Table 4 are all significant at $p < .05$ with comparable coefficients when dropping each accounting firm one at time. We also dropped each of the 63 industries one at a time to assure the results in Table 4 are not driven by individual industries. Again, these results are qualitatively the same as those in Table 4 with respect to coefficients and t-statistics, and we conclude that the results are robust across the spectrum of industries in the sample and are not driven by individual industries.

Auditee Size

Craswell et al. (1995) report evidence that audit fee model parameters are sensitive to client size. To investigate this issue with respect to U.S. data we follow Craswell et al. (1995) and re-estimate the models in Table 4 separately for the upper and lower halves of the sample divided at the median value of total assets for the full sample of 3,994 observations.[13]

In model 1, for the larger clients the nationally top-ranked firm has a significant premium of 11 percent ($p < 0.001$), while for smaller clients there is no premium for the top-ranked firm ($p = 0.323$). This result is consistent with Craswell et al. (1995) who find that the premium for industry leadership in Australia is driven by the upper half of company size in their sample. In model 2, the city leader has a significant fee premium of 14 percent ($p < 0.001$) for larger clients, and a premium of 7 percent ($p = 0.007$) for smaller clients. In model 3, auditors which are *both* national and city leaders have a fee premium of

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[12] The large reduction in sample size is due to the exclusion of some of the largest metropolitan areas in the United States. The 11 MSAs deleted for this analysis are Boston-Cambridge, Dallas-Fort Worth, Detroit-Bloomfield Hills, Indianapolis, Los Angeles-Century City-Irvine, Miami-Fort Lauderdale, New York City-Florham-Jersey City-Melville-Ridgewood-Stamford, Salt Lake City-Ogden, San Francisco-Menlo Park, Tampa (FL), and Washington, D.C.-Baltimore-Mclean.

[13] As an alternative test, we created a set of nine intercept terms coded 1 if an observation is in the second through tenth deciles of client size, respectively, measured by total assets (the first decile is the default intercept). The three models in Table 4 have comparable coefficients and t-statistics on the auditor test variables using this additional control for client size differences (in addition to inclusion of a control variable for log of assets).

22 percent ($p < 0.001$) for larger clients, and a premium of 7 percent ($p = 0.06$) for smaller clients. Auditors that are city but not national leaders have a marginally significant fee premium of 5 percent ($p = 0.11$) for larger clients, and a premium of 7 percent ($p = 0.05$) for smaller clients. Auditors that are national but not city leaders are insignificant at $p > .10$ in both halves of the sample. In addition the intercepts for each subsample are approximately the same, which reduces the likelihood of scale-related coefficient bias arising from company size differences (Barth and Kallapur 1996).

We conclude from this analysis that the results in Table 4 are generally consistent for the upper and lower halves of firm size in the sample. In particular, model 3 has consistent statistical inferences on the auditor test variables, with the main difference being that the magnitude of the premium for joint national-city leadership is bigger for larger clients (22 percent) than for smaller clients (seven percent).

Nonaudit Fees

Whisenant et al. (2003) use a simultaneous equations methodology and find that audit fees and nonaudit fees are independent of one another after controlling for the simultaneous (joint) determination of audit fees and nonaudit fees. If this result generalizes beyond their sample and methodology, then the level of nonaudit fees would not be a correlated omitted variable in a single-equation audit fee model like the one we estimate in Table 4. However, since many prior studies do document a positive correlation between audit and nonaudit fees, we re-estimate the models in Table 4 with an additional control variable for nonaudit fees (natural log). As in prior studies, there is a positive and significant association ($p < .001$) between audit fees and nonaudit fees. Inferences on the auditor indicator variables in Table 4 are qualitatively unchanged with this additional control variable. The auditor coefficients that are significant in Table 4 are significant at $p < .05$ when nonaudit fees are added to model. The premiums for industry leadership are 7 percent in model 1, 12 percent in model 2, and for model 3, the joint national-city leader has a premium of 18 percent, the city leader alone has a premium of 8 percent, and the national leader alone is insignificant at $p > .10$. We conclude that the model specification in Table 4 is robust to the inclusion or exclusion of a variable for nonaudit fees.

Restricted City Sample

We examine a restricted city sample to investigate a subsample of larger industries and larger city-specific audit markets where auditor industry expertise may be more likely to exist because of larger clienteles. The trade-off is that by limiting the number of cities and industries the generality is limited and statistical power of the tests may be reduced. Screens for the restricted sample are the same as the full-city sample plus the following two additional screens: we exclude all industries with less than 25 total observations ($n = 350$), and we exclude those unique city-industry combinations with fewer than five observations ($n = 1,315$). The restricted city sample consists of 2,157 observations in 24 different industries and 31 different cities, and representing 139 unique city-industry combinations and an average of 16 observations per unique city-industry combination. In contrast, the full-city sample has 3,045 observations in 52 different industries and 77 different cities, 481 unique city-industry combinations and an average of six observations per unique city-industry combination.

Results for the restricted city sample are qualitatively the same as Table 4 with one exception in model 3. In model 1, the nationally top-ranked firm earns a premium of 9.53 percent relative to other Big 5 auditors (compared to 7.79 percent in Table 4). In model 2, the city leader earns a premium of 9.97 percent relative to other Big 5 firms (compared to

12.86 percent in Table 4). The results of model 3 are as follows. Observations in which auditors are *both* national and city leaders have a premium of 17.82 percent relative to nonleaders, compared to a premium of 18.53 percent for the full city sample in Table 4. However, there is no fee premia for firms that are a national leader but *not* the city leader, or firms that are a city leader but *not* the national leader. So the only substantive difference between the full sample in Table 4 and restricted city sample analysis is that the city-only industry leader coefficient in model 3 is significant in Table 4 but is insignificant in the restricted sample.

VII. CONCLUSION

The purpose of this study is to use the new U.S. fee disclosures to investigate audit pricing in the U.S. audit market, and in particular to determine if Big 5 accounting firms have reputations for industry expertise that are priced in the audit market. Using the joint national and city framework developed by Ferguson et al. (2003) we find that Big 5 audits are priced as if industry expertise exists and is valued by clients. Our findings give credence to the use of industry leadership based on audit fee market share data to measure an auditor's reputation for industry expertise, and indicate that an auditor's reputation is priced as if *both* firm-wide (national) and city-specific (local) reputations are jointly relevant. Specifically, there are consistent audit fee premia of approximately 19 percent when auditors are *both* national industry leaders and city-specific industry leaders. However, national industry leadership alone, without being a city-specific industry leader, *never* results in a fee premium.

The fact that national leadership (alone) carries no premium is evidence against the existence of "strong" reputation effects arising from the transferability of office-specific expertise. However, the finding that fee premia exist when auditors are jointly national and city leaders is evidence of at least "weak" firm-wide reputation effects. Thus auditor reputation for industry expertise is neither strictly national nor strictly local in character. Rather, auditor industry expertise appears to be most credible to the audit market when the firm is jointly the national leader and city-specific industry leader, indicating there is both a national and local-office dimension to reputation and the pricing of industry expertise.

The audit fee premia documented in this study provide evidence of differentiation among Big 5 auditors based on the joint effects of national industry leadership and city-specific industry leadership. Since higher audit fees for joint national-city industry leaders imply audit quality differences, future research on audit quality may benefit by taking into consideration both the national and city-specific dimensions of auditor reputations identified in this study.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 137–166

The Persistence and Pricing of Earnings, Accruals, and Cash Flows When Firms Have Large Book-Tax Differences

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ABSTRACT: I investigate the role of book-tax differences in indicating the persistence of earnings, accruals, and cash flows for one-period-ahead earnings. I also examine whether the level of book-tax differences influences investors' assessments of future earnings persistence. I find that firm-years with large book-tax differences have earnings that are less persistent than firm-years with small book-tax differences. Further, the evidence is consistent with investors interpreting large positive book-tax differences (book income greater than taxable income) as a "red flag" and reducing their expectation of future earnings persistence for these firm-years. I then investigate potential sources of the lower persistence for firm-years with large book-tax differences. I find that special items contribute in part to the results but that firm-years with large book-tax differences continue to have lower persistence in earnings after controlling for the effect of the special items.

Keywords: *book-tax differences; earnings persistence; accruals; earnings expectations.*

I. INTRODUCTION

I investigate the role of book-tax differences in indicating the persistence of earnings, accruals, and cash flows for one-period-ahead earnings. I also examine whether the level of book-tax differences influences investors' assessments of future earnings persistence. Financial accounting texts claim that the difference between pre-tax financial reporting earnings and taxable income (i.e., book-tax differences) can provide information about current earnings. The underlying maintained hypothesis is that because less discretion is allowed in the computation of taxable income, book-tax differences can be informative

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I appreciate the helpful comments and suggestions from my dissertation committee—Bob Bowen, Dave Burgstahler, Jennifer Koski, Shiva Rajgopal, and Terry Shevlin (Chair)—as well as those from Helen Adams, Michael Bamber, Mary Barth, Bill Beaver, Walt Blacconiere, Mary Margaret Frank, Richard Frankel, Frank Hodge, Jim Jiambalvo, Kathryn Kadous, Dawn Matsumoto, Maureen McNichols, James Myers, Mark Peecher, Mort Pincus, Jamie Pratt, D. Shores, Jim Wahlen, and two anonymous referees. The paper also benefited from the comments of workshop participants at Indiana University, Massachusetts Institute of Technology, Stanford University, the University of Chicago, the University of Georgia, the University of Illinois at Urbana–Champaign, The University of Iowa, the University of Michigan, the University of Pennsylvania, the University of Rochester, the University of Washington, and Washington University in St. Louis. I am grateful for funding from the American Institute of Certified Public Accountants, the Deloitte & Touche Foundation, and an Ernst & Young Faculty Fellowship. This paper won the 2003 ATA/PricewaterhouseCoopers Best Tax Dissertation Award and the 2003 AAA Financial Accounting and Reporting Section Best Dissertation Award.

Editor's note: This paper was accepted by Maureen McNichols, Special Editor.

Submitted January 2003
Accepted March 2004

about management discretion in the accruals process. For example, Revsine et al. (1999, 638) suggest the ratio of pre-tax book income to taxable income can be used as a measure of accounting conservatism or aggressiveness. Palepu et al. (2000, 3–11) point out that an increasing gap between a firm's reported income and its taxable income is a potential "red flag." Penman (2001, 612) includes the difference between book income and taxable income as a diagnostic to detect manipulation of core expenses. He states "if a firm is using estimates to generate higher GAAP income, it must recognize more deferred taxes."[1]

In the wake of recent accounting scandals, some are wondering whether the large differences between book and taxable incomes should have been an indicator of low-quality financial reporting earnings. For example, Seida (2003) in his analysis of Enron's tax disclosures calculates that Enron's taxable income over the years 1996–1999 was $5.8 billion below financial reporting income. He asks whether taxable income is a useful alternative measure of income, or at least a benchmark to evaluate book income. Whether book-tax differences provide information about the quality of earnings has attracted the attention of policy makers as well.[2] For example, Senator Charles Grassley wrote a letter to President Bush on October 7, 2002 calling for additional disclosure of book-tax differences because "the minimal disclosure is a breeding ground for the manipulation of financial statements and abusive tax shelter schemes." Further, Representative Lloyd Doggett has stated, "When investors hear only of rosy earnings while at tax time Uncle Sam only hears of regrets and red ink, something is very wrong. A corporate culture of creative accounting and reporting abuses weakens our economy" (Weisman 2002, A01). The press has also taken note of the potential association of book-tax differences with earnings quality. For example, a *CFO Magazine* article claims that the recent scandals have shifted the focus of the book-tax reconciliation discussion from rooting out tax shelters to rooting out financial fraud (Reason 2002).

Recent academic literature investigates book-tax differences as an indicator of earnings management. Mills and Newberry (2001) report evidence consistent with the magnitude of book-tax differences being positively associated with financial reporting incentives such as prior earnings patterns, financial distress, and bonus thresholds. Phillips et al. (2003) extend this research and report that firm-years with small earnings increases have a larger average deferred tax expense (indicative of book income in excess of taxable income) than firm-years with small earnings decreases and conclude that the deferred tax expense is informative about firms' earnings management activities. Joos et al. (2000) report that the earnings-return relation is weaker when book-tax differences (in absolute value) are large and interpret this as evidence that firms with large book-tax differences have opportunistically managed earnings and investors recognize these actions and attach a lower weight to earnings. Finally, in concurrent research, Lev and Nissim (2004) find that the ratio of taxable income to book income predicts subsequent five-year earnings growth and is strongly (weakly) related to future returns in the pre- (post-) 1993 sample period (i.e., before and after the implementation of the Statement of Financial Accounting Standards No. 109, *Accounting for Income Taxes*) (SFAS No. 109, FASB 1992).

My examination contributes to two lines of research. First, I extend the literature that examines the information in book-tax differences. Though recent research reports that earnings management incentives and lower earnings response coefficients are associated with book-tax differences, there is no direct evidence that large book-tax differences are indicative of earnings that are less persistent. I also examine whether large book-tax differences are associated with less persistent accruals or cash flows. Prior accounting research reports evidence consistent with accrual earnings being more relevant in reflecting firm performance as compared to cash flows (Dechow 1994; Dechow et al. 1998). However, research also reports evidence consistent with the accrual component of earnings being less persistent for future earnings than the cash flow component (Sloan 1996). Because discretionary accruals are less persistent than nondiscretionary accruals (Xie 2001), if book-tax differences indicate discretion in the accruals process, firm-years with large book-tax differences will have less persistent accruals than firm-years with small book-tax differences.

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[1] These statements do not imply that taxable income is a better measure of economic performance of the firm than is financial reporting income. Rather, the statements suggest that in contexts where the divergence between tax and financial reporting income is large, earnings management is more likely and additional scrutiny is warranted.

[2] I discuss the link between quality of earnings and earnings persistence below.

Second, I contribute to the literature that investigates investors' assessments of the persistence of earnings (e.g., Sloan 1996; Xie 2001; Barth and Hutton 2004). I examine whether large book-tax differences influence investors' expectations about the persistence of earnings and its components. Prior studies such as Joos et al. (2000) and Chaney and Jeter (1994) report that returns are less associated with earnings when the firm's book-tax differences are large or highly variable.[3] These tests implicitly assume that earnings are of lower quality when book-tax differences are large and that the market prices the shares accordingly. I extend this analysis and more directly test this link by investigating whether the market's assessment of earnings persistence for firm-years with large book-tax differences is consistent with the observed persistence in earnings.

My results indicate that for firm-years with large positive book-tax differences (i.e., book income in excess of taxable income), pre-tax financial reporting income and the accruals component of earnings are less persistent for one-year-ahead earnings as compared to firm-years with small book-tax differences.[4] In addition, the cash flow component is also less persistent for these firm-years, suggesting that book-tax differences contain information about the underlying cash flow stream as well as accruals.[5] These results are consistent with the conjecture that large book-tax differences are associated with lower earnings persistence. When I investigate investor expectations of future earnings for firm-years with large positive book-tax differences, the evidence suggests that investors reduce the expectation of the persistence of earnings resulting in the accruals component of earnings being priced in a manner consistent with its lower persistence. However, investors reduce the expectation of the persistence of cash flows in excess of that required, thus underestimating the persistence of total earnings for these firm-years.

For firm-years with large negative book-tax differences (i.e., book income less than taxable income), again I find evidence consistent with the accrual and cash flow components of earnings being less persistent for one-year-ahead earnings relative to firm-years with small book-tax differences. Thus, while most claims regarding the information in book-tax differences focus on firms that have book income in excess of taxable income, my results indicate that book-tax differences where book income is less than taxable income also provide information about the persistence of earnings. When I investigate investors' expectations of persistence for these firm-years, I find evidence consistent with prior research; the persistence of accruals is overestimated. Thus, large differences between book and taxable incomes for these firm-years do not appear to aid investors in estimating accruals persistence.

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[3] Chaney and Jeter's (1994) study is pre-SFAS No. 109 when only deferred tax liabilities (not deferred tax assets) were required to be recorded.

[4] In my sample, the scaled deferred tax expense and scaled total accruals are not highly correlated (correlation of −0.008); thus, the deferred tax expense does not simply equal accruals but rather a subset of total accruals.

[5] I discuss the possible implications of the cash flow results below.

I perform several additional analyses. First, I investigate the effect of special items on my results. I assume that all special items create a book-tax difference and remove the special items from my measures of book-tax differences, earnings, and accruals. I find that while the results are somewhat weaker, firm-years with large book-tax differences still have significantly lower persistence in both accruals and cash flows.

Second, I investigate whether the book-tax differences have lower persistence for one-year-ahead earnings than accruals excluding the book-tax differences. Specifically, I partition total pre-tax accruals into the book-tax differences (a proxy for discretionary accruals) and the remaining portion of accruals (a proxy for nondiscretionary accruals) and include both of these separately in the regression of future earnings on current cash flows and accruals. I find that the book-tax differences are less persistent for future earnings than are accruals excluding the book-tax differences. Thus, using the book-tax differences as a proxy for discretionary accruals, as in Phillips et al. (2003), I find that the discretionary accruals have lower persistence than nondiscretionary accruals, consistent with Xie (2001).

The rest of the paper proceeds as follows. The next section provides institutional detail about book-tax differences. The third section contains common arguments both for and against the book-tax differences containing information about earnings persistence and a statement of my hypotheses. The fourth section provides a description of the sample selection and data used for the tests, and the fifth explains the empirical methods used. The sixth section describes the results and discusses sensitivity tests and additional analyses, and the final section concludes.

II. BOOK-TAX DIFFERENCES

Management calculates corporate income for two purposes each year. The first is for financial reporting purposes under Generally Accepted Accounting Principles (GAAP) and the second is done in accordance with the Internal Revenue Code (IRC) to determine the corporation's tax liabilities. IRC Section 446(a) states, "Taxable income shall be computed under the method of accounting on the basis of which the taxpayer regularly computes his income in keeping his books." Thus, for most corporations, taxable income is computed on the accrual basis rather than the cash method.[6]

Despite both book and taxable income being prepared on an accrual basis, differences between book and taxable incomes can be large. Some differences, known as permanent differences, are items included in one measure of income but never included in the other.[7] I do not incorporate permanent differences into my primary analysis for several reasons. First, permanent differences are extremely difficult to measure. For example, permanent book-tax differences are generally inferred from the current tax expense and the effective tax rate (total tax expense divided by pre-tax financial accounting earnings). However, tax rate differences (for foreign-sourced earnings or state income taxes) and tax credits are mixed with permanent differences in the calculation of the effective tax rate and current income tax expense.[8] In addition, statutory tax breaks (e.g., tax-exempt interest and the dividend received deduction) are often included in these calculations and are not indicative of earnings quality related to the accruals process.[9] Thus, due to the difficulty in measuring true permanent book-tax differences and the financial accounting textbook suggestions to exclude the effects of permanent differences I do not examine the relation between permanent differences and earnings persistence.

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[6] In fact, some prior studies rely on the consistencies in tax and book accruals to formulate empirical tests. For examples, see Guenther (1994), Manzon (1992), Maydew (1997), and Guenther et al. (1997). An exception to the requirement of accrual tax accounting is in IRC Section 448, which provides that a corporation with average annual gross receipts of $5 million or less for its three most recent taxable years may use the cash method for tax purposes.

[7] Technically, the term "permanent difference" is not used in SFAS No. 109. The concept of permanent differences under SFAS No. 109 is limited to events recognized in the financial statements that do not have tax consequences, such as tax-exempt interest. This type of permanent difference continues to impact the calculation of current tax expense under SFAS No. 109 (KPMG 1992).

The remaining book-tax differences are temporary differences and constitute the focus of this study. SFAS No. 109 uses a balance sheet approach. Temporary differences between book and taxable incomes each year are changes in the firm's book-basis balance sheet relative to its tax-basis balance sheet. Basis differences arise because of differing requirements for the timing of recognition of income and expense items. For book purposes, revenue is recognized when earned and expense recognition is either matched against the related revenue or recorded in the accounting period in which the expense is incurred. However, GAAP provides managers with considerable discretion in their choice of accounting procedures (Watts and Zimmerman 1986, 215). Managers may choose between different accounting methods, use varying periods and estimates for cost amortization (e.g., for depreciation and goodwill) and exercise judgment with respect to recording reserve allowances (e.g., bad debt allowances, warranty reserves, accrued compensation, etc.) (Mills and Newberry 2001).

For tax purposes, however, firms must "clearly reflect income."[10] Revenue is generally recorded when cash is received; thus, deferred (or unearned) revenue does not exist under the IRC. In addition, for tax purposes conservatism is not an objective (for the Treasury) and thus an item may not be deducted until more stringent conditions are satisfied, reducing the level of discretion in the calculation of taxable income.[11]

Temporary book-tax differences include future taxable and future deductible amounts. Future taxable amounts create or increase deferred tax liabilities and require recognition of a deferred tax expense. In contrast, future deductible amounts create or increase deferred tax assets and require the recognition of a deferred tax benefit (credit to deferred tax expense). All else equal, an increase in deferred tax liabilities is consistent with a firm currently recognizing revenue and/or deferring expense for book purposes relative to its tax reporting (book income in excess of taxable income). All else equal, an increase in deferred tax assets is consistent with a firm currently recognizing expense and/or deferring revenue for book relative to tax income (book income less than taxable income) (Phillips et al. 2003).

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[8] See Hanlon (2003) for a more detailed discussion of problems using the rate reconciliation or effective tax rate to infer total book-tax differences or taxable income.

[9] Revsine et al. (1999, 638) also advocate excluding the effect of permanent differences because these are "unrelated to quality-of-earnings choices." There are notable exceptions, however, where permanent differences are indicative of earnings quality. One such example is nondeductible in-process research and development (IPRD) in acquisitions. For financial reporting purposes this amount is often written off immediately (perhaps to provide for higher reporting of future earnings); however, for tax purposes, the amount is not deductible if no tax basis exists. Thus, it generally constitutes a permanent difference that is potentially indicative of pre-tax earnings persistence since the write-off of the IPRD is presumably transitory in nature. There are other permanent type differences that may be indicative of earnings quality, but due to the measurement problems I discuss above, I exclude these from my tests. However, I perform a sensitivity analysis using an estimate of total book-tax differences below. In addition, I note that despite these concerns, Schmidt (2003) and Lev and Nissim (2004) investigate information in total book-tax differences using the effective tax rate and the ratio of estimated taxable income to book income, respectively.

[10] IRC Section 446 (b).

[11] First, under the "all events" test, all of the events that determine the taxpayer's liability for the expense must have occurred and, second, the amount of the taxpayer's liability must be determined with reasonable accuracy. Third, before an item of expense may be accrued for tax purposes, "economic performance" must have occurred. In the case of a liability of a taxpayer that requires a payment for property or services, economic performance is deemed to occur as the property or services are provided to the taxpayer (Guenther 1994).

III. HYPOTHESIS DEVELOPMENT

While the persistence of earnings is likely not a complete definition of earnings quality, it is often considered a qualitative characteristic of earnings.[12] For example, FASB's Concepts Statement No. 2, *Qualitative Characteristics of Accounting Information,* includes the predictive value of earnings as a component of relevance. Jonas and Blanchet (2000) specifically add earnings persistence as a descriptor of the predictive value of earnings in their proposed framework for determining earnings quality. Further, earnings persistence is a value-relevant characteristic of earnings as made explicit in the Ohlson (1995) valuation model (Barth and Hutton 2004). Thus, because persistence is a value-relevant characteristic of earnings, any information provided in the level of book-tax differences about the persistence of earnings may assist investors in assessing firm value.

Arguments can be made both for and against book-tax differences reflecting information about the persistence of current earnings. First, many textbooks claim that management's income-increasing accrual choices are evidenced by large differences between book and taxable incomes. For example, Revsine et al. (1999, 633) state that increases in deferred tax liability balances (which reflect book income in excess of taxable income) "might be an indication of deteriorating earnings quality." Revsine et al. (1999, 634) also suggest that shrinkage in deferred tax asset balances should be investigated because the changes in the related balance sheet accounts may be used as "a way to artificially increase earnings." Because the sum of a firm's income over all years must equal the sum of its cash flows, managers must eventually reverse any "excessive" earnings-increasing (or decreasing) accruals made in the past (Jones 1991). As a result, if large book-tax differences are evidence of income-increasing accrual choices, the accruals for these firms should exhibit greater future reversals, on average, and thus a lower persistence in accruals and earnings.

However, book-tax differences do not simply reflect discretion in financial reporting. Financial accounting accruals are intended to overcome measurement problems over finite intervals and provide a signal of managers' private information about firm performance (Dechow 1994). In contrast, the objectives of the IRC are to provide a framework for efficient and equitable determination of tax liabilities and the subsequent collection of revenue, and to provide incentives for firms to engage in particular activities (Scholes et al. 2002; Manzon and Plesko 2002). Thus, differences between book and taxable incomes may not be informative about earnings management or cross-sectional variation in earnings persistence.

In addition, book-tax differences can be generated by tax-planning strategies. An implicit assumption when using book-tax differences to infer earnings quality is that there is cross-sectional variation in the ability of firm managers to manipulate financial reporting income, but that there is not cross-sectional variation in managers' ability to manipulate taxable income. The recent debate surrounding corporate tax shelters suggests otherwise.[13]

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[12] Schipper and Vincent (2002, 2) state "Although the phrase 'earnings quality' is widely used in the financial press, in analyst reports, in documents issued by regulators, and in accounting research, there is neither an agreed-upon meaning assigned to the phrase nor a generally accepted approach to measuring earnings quality."

[13] Corporate tax shelters of the 1990s were very aggressive strategies that conformed to the letter of the tax law but not the intent. Some of the shelters have been overturned in the courts and broad legislation has been enacted in order to eliminate their use. For more information on tax shelters see Novack and Saunders (1998) and U.S. Treasury (1999). However, not all firms engaged in these aggressive transactions, indicating cross-sectional variation in tax aggressiveness.

Consistent with book-tax differences representing aggressive tax reporting, Mills (1998) reports that the larger the book-tax differences the greater the likelihood of IRS audit and adjustment. Aggressive tax reporting decreases taxable income relative to financial reporting income (assuming firms do not conform financial reporting to tax reporting) and, unless done using strategies that create permanent differences, is reflected in a larger deferred tax expense, all else constant.[14]

Therefore, because there are a variety of sources of book-tax differences, whether large book-tax differences are indicative of lower persistence in (pre-tax) earnings is not clear. In the accounting texts the primary focus is on book-tax differences where book income is greater than taxable income. However, recent studies (e.g., Joos et al. 2000) conjecture that firm-years with large book-tax differences in either direction are suspected of having lower-quality earnings. To allow for differences across positive and negative book-tax differences, I investigate the implications of large book-tax differences on the persistence of earnings by partitioning my sample into three subsamples. The first is comprised of firm-years in the highest quintile of all firms, each year ranked by temporary book-tax differences (the calculation of which is described below) scaled by average total assets. I label this group LPBTD (large positive book-tax differences—book income in excess of taxable income). The second group consists of firm-years in the lowest quintile of all firms, each year ranked by scaled temporary book-tax differences. I label this group LNBTD (large negative book-tax differences—book income less than taxable income). The final group consists of the remaining firm-years—those with relatively small scaled book-tax differences—which I label SmallBTD. Using three subsamples allows tests of: (1) whether both large book-tax difference groups have lower earnings persistence relative to firm-years with small book-tax differences, and (2) whether the persistence of earnings is the same between the two groups with large book-tax differences. My first hypothesis in the alternative form is:

> **H1:** Pre-tax earnings persistence for firm-years with large negative or large positive book-tax differences is lower than pre-tax earnings persistence for firm-years with small book-tax differences.

As discussed above, the initial maintained hypothesis in accounting texts and recent research assumes large book-tax differences indicate low-earnings quality because of more subjectivity in the accruals process for financial reporting purposes as compared to tax reporting purposes. If book-tax differences are indicative of subjectivity in the financial reporting accruals process, firm-years with large book-tax differences will have an accruals component of earnings that is less persistent than firm-years with relatively small book-tax differences. This leads to my second hypothesis, stated in alternative form:

> **H2:** The persistence of the accruals component of earnings for future earnings is lower for firm-years with large negative or large positive book-tax differences relative to firm-years with small book-tax differences.

My final hypothesis investigates whether stock prices reflect different investor expectations about future earnings based on the level of book-tax differences. Sloan (1996) reports evidence consistent with investors not incorporating accurately the persistence of accruals into their expectations of earnings. Joos et al. (2000, 21) report lower-earnings-response coefficients for firm-years with large book-tax differences and conclude that "large differences between book and tax earnings suggest that management has used different accruals to account for the same underlying transactions, introducing the possibility that management's reporting discretion is being used opportunistically." The authors interpret the lower earnings-return relation as evidence that investors recognize this possibility and attach a lower weight to earnings. Because of these two findings, I investigate investor expectations of the persistence of the accrual and cash flow components of earnings as reflected in share prices for firm-years with large book-tax differences to determine whether the information in book-tax differences affects investors' assessments of accrual and cash flow persistence. Though Sloan (1996) provides evidence consistent with investors not correctly understanding the persistence in accruals and cash flows, if investors use the level of book-tax differences as information about the persistence of accruals then they may not misprice accruals in firm-years with large book-tax differences. This leads to my third hypothesis:

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[14] In general, these differences created by aggressive tax planning should not be associated with lower persistence in financial reporting accruals because, by definition, the accrual for tax is not the same as the accrual for book when a book-tax difference is created. I note though that this cannot be specifically tested because one cannot separate the differences caused by aggressive tax planning from those motivated by aggressive earnings recognition.

> **H3:** The expectation of pre-tax earnings persistence reflected in stock prices for the accrual component of pre-tax earnings is consistent with the observed persistence of accruals for firm-years with relatively large book-tax differences.

IV. SAMPLE SELECTION

I begin with a sample of firm-years from 1994–2000 in the intersection of CRSP and Compustat databases, that are incorporated in the U.S., are in industries other than financial services and utilities, and have nonmissing asset data (47,507 observations).[15] I use 1994 as a starting point because the accounting for income taxes changed significantly with the implementation of SFAS No. 109 effective in 1993, and thus using firm-years after the accounting change provides consistent accounting over the sample period. To be included in the final sample, the observation must not have missing variables used in the regressions (22,242 observations excluded), a reported pre-tax financial reporting loss (6,447 observations excluded), a negative current tax expense (1,518 observations excluded), or a net operating loss identified on Compustat (3,194 observations excluded). The reason for these screens is that tax losses can be carried forward and thus become deferred tax assets, changes in which can obscure the effects of "true" book-tax differences in the deferred tax expense account.[16] My final sample consists of 14,106 firm-years (4,048 firms). I partition this sample as described above into three subsamples: LPBTD (2,823 firm-years consisting of 1,663 firms), LNBTD (2,823 firm-years consisting of 1,751 firms), and small book-tax differences (8,460 firm-years consisting of 3,236 firms).[17]

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[15] I exclude observations with a foreign incorporation code because of different tax reporting in foreign countries. I exclude financial services and utility industry firm-years because of different reporting requirements (tax and book) and the lack of Compustat disclosure of the deferred tax accounts for financial institutions.

[16] Assuming no deferred tax asset valuation allowance is placed on the net operating loss (NOL), the creation of an NOL will reduce deferred tax expense. For example, suppose a firm generates an NOL with a temporary difference, say depreciation. The tax effects of the depreciation book-tax difference will be a debit to the deferred tax expense (credit to deferred tax liability) and the NOL will be recorded as a credit to the deferred tax expense (debit to deferred tax asset), thus reflecting a lower (or possibly zero) deferred tax expense when there is a true book-tax difference for depreciation. Though I cannot eliminate firms that have a valuation allowance established against deferred tax assets, a change in which may also obscure the information in the deferred tax expense account, eliminating firms with NOLs should mitigate the effect of the valuation allowance because the NOL is a common deferred tax asset to which the valuation allowance is applied. I also eliminate firms with a negative current tax expense as an additional screen to help mitigate the coding errors (Mills et al. 2003).

V. RESEARCH DESIGN

Hypotheses 1 and 2: Earnings Persistence

I estimate the persistence of pre-tax earnings using the following equation:

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + v_{t+1} \tag{1}$$

where *PTBI* is pre-tax book income (Compustat data item #170).[18] As in Sloan (1996), I scale all variables by average total assets to allow for cross-sectional comparability. To test whether firm-years with large negative (positive) book-tax differences have lower earnings persistence, I estimate Equation (2), which permits the coefficient on earnings to vary depending on the level of the book-tax differences by introducing an indicator variable for each of the large book-tax difference subsamples.

$$\begin{aligned} PTBI_{t+1} = {} & \gamma_0 + \gamma_1 LNBTD_t + \gamma_2 LPBTD_t + \gamma_3 PTBI_t + \gamma_4 PTBI_t * LNBTD_t \\ & + \gamma_5 PTBI_t * LPBTD_t + \varepsilon_{t+1} \end{aligned} \tag{2}$$

In Equation (2), *LNBTD* is an indicator variable equal to 1 for firm-years with scaled temporary book-tax differences in the lowest quintile of firms in each year (large negative book-tax differences), and 0 otherwise; *LPBTD* is an indicator variable equal to 1 for firm-years with scaled temporary book-tax differences in the highest quintile each year (large positive book-tax differences), and 0 otherwise.[19] All other variables are as defined previously. If firm-years having large negative (positive) book-tax differences have lower earnings persistence than firm-years with small book-tax differences, then $\gamma_4 < 0$ ($\gamma_5 < 0$), consistent with H1.

In order to more directly test the claims that book-tax differences indicate lower earnings persistence because of discretion in accruals, I partition earnings into pre-tax accruals and pre-tax cash flows and estimate the following equations which are analogous to Equations (1) and (2):

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[17] Note the total number of firms in the subsamples exceeds the number of firms in the total sample because firms move from being in one subsample to another subsample from year to year. For example, approximately 76 percent of the firms in the SmallBTD group are in either or both the LPBTD and LNBTD groups in at least one year of the sample period. Thus, the same firms are not included in the same subsample in each year which controls for any time-series stationary correlated omitted variables.

[18] I use pre-tax book income because it is the difference between pre-tax book income and taxable income that constitutes book-tax differences. In contrast, Sloan (1996) uses operating income after depreciation (item #178) and Xie (2001) uses income before extraordinary items (item #18). For firm-years with a minority interest, I calculate pre-tax book income as data item #170 less minority interest (item #49) to obtain the pre-tax book income on which the tax provision is calculated.

[19] To calculate the deferred tax expense (benefit) I use the sum of federal and foreign deferred tax expense (item #269 and item #270, respectively) and where missing I use total deferred taxes (item #50). I include foreign as well as U.S. deferred taxes because pre-tax financial reporting income includes income of foreign entities. However, I exclude state-deferred taxes since these are taxes on the same income as federal deferred taxes. I gross up the deferred tax expense by the statutory tax rate during the sample period (35 percent) in order to convert the number into an estimate of the firm's temporary book-tax differences rather than the tax effect of the differences.

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTCF_t + \gamma_2 PTACC_t + \xi_{t+1} \quad (3)$$

$$\begin{aligned} PTBI_{t+1} = {} & \gamma_0 + \gamma_1 LNBTD_t + \gamma_2 LPBTD_t + \gamma_3 PTCF_t + \gamma_4 PTCF_t * LNBTD_t \\ & + \gamma_5 PTCF_t * LPBTD_t + \gamma_6 PTACC_t + \gamma_7 PTACC_t * LNBTD_t \\ & + \gamma_8 PTACC_t * LPBTD_t + \varepsilon_{t+1} \end{aligned} \quad (4)$$

where $PTACC_t$ is pre-tax accruals, $PTCF_t$ represents pre-tax cash flows, and all other variables are as defined above. I calculate the earnings component amounts as pre-tax to be consistent with the dependent variable measure. I calculate pre-tax cash flows as total operating cash flow (item #308) less cash flow due to extraordinary items (item #124) plus taxes paid in cash (item #317).[20] I calculate pre-tax accruals as pre-tax book income less pre-tax cash flows.[21]

In Equation (4), γ_6 reflects the persistence of accruals for firm-years with small book-tax differences and γ_7 (γ_8) reflects the difference, if any, in the persistence of accruals for firm-years with large negative (positive) book-tax differences. If the large book-tax differences are associated with less persistent accruals, then $\gamma_7 < 0$ and $\gamma_8 < 0$, consistent with H2. The coefficient γ_3 reflects the persistence of cash flows. Based on prior research I expect $\gamma_6 < \gamma_3$ (Sloan 1996). The coefficient γ_4 (γ_5) reflects the difference, if any, in the persistence of cash flows for firm-years with large negative (positive) book-tax differences. While I have no prediction for γ_4 or γ_5, these coefficients may be significant if firm-years with large book-tax differences have more (or less) transitory cash flow components.

Hypothesis 3: Tests of Market Pricing

To address H3, I investigate the expectations of future earnings embedded in stock prices using the Mishkin (1983) methodology employed by Sloan (1996), Barth and Hutton (2004), Bradshaw et al. (2001), Xie (2001), Burgstahler et al. (2002), and others. Specifically, I jointly estimate the following systems of equations, for each subsample.

Market rationality with respect to total earnings:

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + v_{t+1} \quad (1)$$

$$SAR_{t+1} = \alpha + \beta_1(PTBI_{t+1} - \gamma_0 - \gamma_1^* PTBI_t) + \varepsilon_{t+1}. \quad (5)$$

Market rationality with respect to earnings components (H3):

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTCF_t + \gamma_2 PTACC_t + \xi_{t+1} \quad (3)$$

$$SAR_{t+1} = \alpha + \beta_1(PTBI_{t+1} - \gamma_0 - \gamma_1^* PTCF_t - \gamma_2^* PTACC_t) + \varepsilon_{t+1} \quad (6)$$

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[20] I adjust the cash flow number by the taxes paid in cash rather than the current tax expense on the income statement due to the accounting for the tax benefit of stock options. Although the option expense/deduction is recorded differently for book and tax purposes, it is not reflected as a book-tax difference in calculating the income tax expense for financial reporting. If I use the current tax expense from the income statement rather than the taxes paid in cash, cash flow would be overstated (because the tax benefits of the options would be added back to cash flow twice) and the accruals component understated by this amount. See Hanlon and Shevlin (2002) for additional details regarding the accounting for tax benefits of stock options. In addition, because during my sample period almost all firms elected the intrinsic value method of valuing stock options, there is no expense for financial accounting purposes and thus there are no accruals related to stock option expensing.

[21] This methodology is consistent with the suggestions in Collins and Hribar (2002) to use the statement of cash flow data where possible rather than balance sheet data due to measurement error in the balance sheet data from merger and acquisition activity. Also, because I utilize pre-tax measures in my tests, the tax benefits of stock options, if any, will not cause measurement error in the accruals component of earnings when using this method.

where SAR_{t+1} is the annual size-adjusted abnormal return, inclusive of dividends, calculated as the raw buy-and-hold return for the security minus the buy-and-hold return for the same size decile portfolio of firms. The return accumulation period begins four months after the end of the fiscal year to allow financial statement information to be disseminated. If a security delists during a particular year, I include the CRSP delisting return in the buy-and-hold annual return, and the proceeds are reinvested in the CRSP size-matched decile for the remainder of the year.[22] All other variables are as defined above.

I estimate the system separately for each subsample to control for variation across the subsamples in the persistence of the accruals and cash flows. If share prices correctly reflect the persistence of earnings and the cash flow and accruals components, then $\gamma_1^* = \gamma_1$ in Equations (1) and (5), and $\gamma_1^* = \gamma_1$ and $\gamma_2^* = \gamma_2$ in Equations (3) and (6). I use a likelihood ratio statistic to test the restrictions that $\gamma_1^* = \gamma_1$ and $\gamma_2^* = \gamma_2$ (Mishkin 1983). The statistic is distributed as a $\chi^2(q)$ where q is the number of restrictions tested. If large book-tax differences facilitate the accurate pricing of accruals then γ_2^* will be closer to γ_2 in the system of Equations (3) and (6) for firm-years with large book-tax differences.

Return Regression Tests

I supplement the Mishkin (1983) tests by estimating hedge portfolio returns using annual return regressions (Fama and MacBeth 1973).[23] The use of the return regressions (i.e., examining returns to trading strategies) allows an assessment of the economic significance of any deviations from market efficiency implied by the Mishkin (1983) analysis. Estimating the regression annually mitigates any potential foresight bias in the Mishkin (1983) analysis from pooling observations over years (Wahlen 2002), although the seven-year sample limits the power of this test. I estimate the relation between future returns and the portfolio rank of accruals and other control factors over the entire sample and over the subsamples of firms using the following equation.

$$SAR_{t+1} = \beta_0 + \beta_1 PTACC_t^{dec} + \beta_2 \ln MVE_t^{dec} + \beta_3 \ln BM_t^{dec} + \beta_4 Beta_t^{dec} + \beta_5 EP_t^{dec} + \beta_6 SAR_t^{dec} + \varepsilon_{t+1} \qquad (7)$$

PTACC represents pre-tax accruals, ln*MVE* is the natural logarithm of market value of equity, ln*BM* is the natural logarithm of the book-to-market ratio, *Beta* is the common stock beta (calculated as the systematic risk estimated from a regression of monthly raw returns on the value-weighted portfolio return over a 60-month period prior to the abnormal return accumulation period) (Fama and French 1992), *EP* is the earnings-to-price ratio (Basu 1977), *SAR* is the size-adjusted security returns for the preceding year to control for short-run return trends (Jegadeesh and Titman 1993). Each variable is converted to a rank variable scaled to range from 0 to 1. This scaling permits the interpretation of the variables' respective coefficients as the return to a zero investment portfolio with a long position in stocks of the firm-years with positive weights and a short position in the stocks of the firm-years with negative weights (Bernard and Thomas 1990; Dechow and Sloan 1997; Frankel and Lee 1998). To enable interpretation of the coefficients as zero investment portfolio returns, the returns used in the regressions must all be for the same time period and the accounting information used as independent variables must be available to the market at the time the return accumulation period begins. To address this issue, I estimate the regressions using only the December year-end firm-years from my sample (n = 7,497). Thus, I estimate Equation (7) annually for December year-end firm-years and report the average coefficient over the years. I test significance by calculating the standard error from the distribution of annual coefficients (n = 7). If investors overweight the accrual component of earnings in each subsample of firm-years, then $\beta_1 < 0$. If book-tax differences facilitate the assessment of the persistence of accruals, then β_1 should not be significant for firm-years with large book-tax differences, consistent with H3.

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[22] Firms that were delisted due to poor performance (delisting codes 500 and 520–584) frequently have missing delisting returns. I correct for this, as recommended in Shumway (1997) and Shumway and Walther (1999), by using delisting returns of −35 percent for NYSE/AMEX firms and −55 percent for NASDAQ firms for these delisting codes.

[23] I note that while the Mishkin (1983) test of market rationality has been used extensively in accounting research, the Mishkin framework as employed in the accounting literature has recently come under scrutiny. For example, Kraft et al. (2001) examine the use of the Mishkin (1983) framework and find evidence consistent with specification problems when applying the Mishkin (1983) framework to data similar to that in accounting studies. However, they state they view their results as preliminary.

VI. RESULTS

Descriptive Statistics

Table 1 presents descriptive statistics and variable correlations for the entire sample. All financial statement variables are winsorized (reset) at the 1st and 99th percentiles. The mean and median accruals are negative, consistent with prior research (Dechow 1994), primarily reflecting the depreciation accrual.

Panel B presents univariate correlations. Scaled pre-tax accruals and scaled deferred tax expense are correlated at only −0.008 (p = 0.3227), suggesting that the two measures are not merely substitutes for each other. Cash flows and accruals are significantly negatively correlated consistent with prior studies (Dechow 1994).

Table 2 provides descriptive statistics for the three subsamples of firm-years. The table reveals several characteristics of the subsamples. For example, firm-years with large negative book-tax differences are smaller in terms of total assets, but not significantly different in terms of market value of equity than the other two subsamples. In addition, these firm-years appear to be higher growth firms as sales growth and net operating asset growth are larger for this set of firm-years relative to the other two groups. The LPBTD subsample appears to obtain at least part of the high book-tax differences through tax planning as evidenced by the lower current effective tax rate (current tax expense divided by pre-tax income).

In untabulated data, I find no industry clustering within the groups. Industry composition is similar across the subsamples with no one industry comprising more than 17 percent of any subsample and industries that are more highly represented in one subsample are also more highly represented in the others. As a result, industry controls are not used in the following tests.

Tests of Hypotheses 1 and 2: Earnings Persistence

Panels A and B of Table 3 present the results from estimating Equations (1) and (2). Panel A indicates that firm-years in my sample have mean reverting earnings performance consistent with previous findings in Sloan (1996) and Xie (2001).

Panel B reveals that firm-years with large book-tax differences have lower persistence in pre-tax earnings than firm-years with small book-tax differences. Firm-years with large negative and large positive book-tax differences have significantly less persistent earnings than firm-years with small book-tax differences ($\gamma_4 = -0.100$ and $\gamma_5 = -0.212$, two-tailed p-value of 0.0001), consistent with the alternative hypothesis stated in H1.

TABLE 1
Descriptive Statistics and Correlations among Selected Variables
(14,106 firm-years, 1994–2000)

Panel A: Descriptive Statistics

Variable	Mean	Standard Deviation	25%	Median	75%
$PTBI_{t+1}$	0.093	0.121	0.0368	0.093	0.157
$PTBI_t$	0.132	0.092	0.066	0.113	0.176
$PTCF_t$	0.143	0.114	0.073	0.136	0.207
$PTACC_t$	−0.010	0.094	−0.065	−0.023	0.030
DTE_t	0.001	0.037	−0.014	0.001	0.018
$AVETA_t$	1,726	10,938	55.250	168.590	617.890
SAR_{t+1}	−0.026	0.343	0.000	0.000	0.000

Panel B: Contemporaneous Pearson (Spearman) Correlations on the Lower (Upper) Diagonal

	$PTBI_{t+1}$	$PTBI_t$	$PTCF_t$	$PTACC_t$	DTE_t
$PTBI_{t+1}$		0.5942	0.5011	−0.0376	−0.0884
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
$PTBI_t$	0.5164		0.5846	0.1967	−0.0255
	(0.0001)		(0.0001)	(0.0001)	(0.0001)
$PTCF_t$	0.4747	0.5880		−0.6009	−0.0311
	(0.0001)	(0.0001)		(0.0001)	(0.0000)
$PTACC_t$	−0.0681	0.2441	−0.6285		−0.0074
	(0.0001)	(0.0001)	(0.0001)		(0.3809)
DTE_t	−0.0609	−0.0286	−0.0357	−0.0083	
	(0.0001)	(0.0001)	(0.0001)	(0.3227)	

Variable Definitions (Compustat data item or method of calculation in parenthesis):
$PTBI_{t+1}$ = pre-tax book income one-year-ahead (item #170);
$PTBI_t$ = pre-tax book income in the current year (item #170);
$PTCF_t$ = pre-tax cash flow for the current year (item #308 + item #317 − item #124);
$PTACC_t$ = pre-tax accruals for the current year ($PTBI - PTCF$);
DTE_t = deferred tax expense in the current year grossed up by statutory tax rate [(sum of items #269 and #270 and where missing item #50) divided by 35 percent];
$AVETA_t$ = average total assets for the firm (item #6); and
SAR_{t+l} = size-adjusted return calculated as the buy-and-hold return of the security starting in the fourth month after the fiscal year-end of the current year less the buy-and-hold return of a size-matched portfolio.
All variables except *AVETA* and *SAR* are scaled by average total assets.

I next decompose earnings into cash flow and accruals to test H2. Panels A and B of Table 4 present the results of estimating Equations (3) and (4), respectively. Consistent with prior research, I find that the accruals component of earnings is significantly less persistent than the cash flow component with coefficient weightings of 0.49 and 0.75, respectively.[24] The results in Panel B are consistent with the accruals component of earnings being significantly less persistent for both the LNBTD and LPBTD subsamples as compared to firm-years with small book-tax differences ($\gamma_7 = -0.115$ and $\gamma_8 = -0.187$). In addition, the

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[24] An F-test reveals that these coefficients are significantly different at the 0.0001 level.

TABLE 2
Descriptive Statistics for Subsamples of Firm-Years Partitioned Based on Level of Temporary Book-Tax Differences

	LNBTD					SmallBTD					LPBTD				
	n = 2,823[a]					n = 8,460[a]					n = 2,823[a]				
Variable	**Mean**	**St. Dev.**	**25%**	**Median**	**75%**	**Mean**	**St. Dev.**	**25%**	**Median**	**75%**	**Mean**	**St. Dev.**	**25%**	**Median**	**75%**
$PTBI_{t+1}$	***0.112***	0.140	0.041	***0.114***	0.195	0.088	0.115	0.036	0.089	0.150	*0.087*	0.112	0.037	*0.088*	0.144
$PTBI_t$	***0.153***	0.110	0.069	***0.131***	0.210	0.123	0.086	0.059	0.106	0.167	***0.138***	0.083	0.080	***0.118***	0.172
$PTCF_t$	***0.165***	0.130	0.085	***0.156***	0.243	0.132	0.109	0.067	0.128	0.194	***0.150***	0.108	0.087	***0.143***	0.211
$PTACC_t$	−0.011	0.110	−0.081	**−0.026**	0.046	−0.009	0.088	−0.060	−0.022	0.027	**−0.013**	0.092	−0.066	**−0.025**	0.027
DTE_t	***−0.050***	0.033	−0.061	***−0.037***	−0.026	0.002	0.011	−0.007	0.000	0.010	***0.049***	0.025	0.030	***0.040***	0.059
$AVETA_t$	***1,069***	6,233	42.18	***114.56***	383.29	1.891	12,905	57.65	176.07	642.02	*1,888*	7,709	68.73	***213.65***	835.48
ROE_t	**0.179**	0.136	0.086	***0.158***	0.239	0.150	0.108	0.081	0.135	0.195	**0.178**	0.124	0.106	***0.153***	0.215
MVE_t	3,051	20,759	64.84	215.13	855.34	2.535	15,023	59.93	198.35	793.20	2.356	9,810	78.18	**273.94**	989.67
BM_t	***0.470***	0.486	0.209	***0.362***	0.605	0.608	0.557	0.301	0.492	0.778	***0.536***	0.430	0.283	***0.465***	0.690
SAR_t	***0.046***	0.485	0.000	0.000	0.000	0.000	0.335	0.000	0.000	0.000	*−0.001*	0.295	0.000	0.000	0.000
SAR_{t+1}	−0.018	0.435	0.000	0.000	0.000	−0.029	0.317	0.000	0.000	0.000	−0.024	0.310	0.000	0.000	0.000
$Beta_t$	**1.150**	0.796	0.709	***1.000***	1.536	0.956	0.696	0.559	0.942	1.268	0.973	0.694	0.588	***1.000***	1.290
ETR_t	0.403	7.241	0.285	***0.365***	0.400	0.432	2.059	0.339	0.377	0.400	0.399	0.411	0.350	***0.379***	0.400
$CETR_t$	***0.802***	0.790	0.350	***0.400***	0.510	0.399	2.318	0.269	0.316	0.354	***0.194***	0.225	0.117	***0.195***	0.252
$Tax\ Paid_t$	0.053	0.047	0.019	0.042	0.074	0.040	0.034	0.015	0.032	0.060	0.031	0.030	0.010	0.023	0.043
$Sales_t$	***1,246***	6,497	58.56	***162.82***	557.97	1,883	8,669	78.99	242.44	856.98	*1,916*	6,900	84.68	*253.31*	950.78
$SalesGrow_t$	***0.365***	0.779	0.074	***0.210***	0.438	0.298	1.981	0.046	0.137	0.285	0.285	0.853	0.056	***0.163***	0.340
$NOAGrow_t$	***1.465***	0.879	1.019	***1.209***	1.606	1.349	0.755	1.019	1.142	1.389	*1.363*	0.727	1.041	***1.175***	1.431
$Leverage_t$	**0.046**	15.289	0.001	***0.108***	0.490	0.634	2.334	0.042	0.338	0.810	0.588	0.345	0.095	***0.431***	0.874
$SpecialItems_t$	***−0.013***	0.044	0.000	**0.000**	0.000	−0.001	0.039	0.000	0.000	0.000	***0.004***	0.053	0.000	**0.000**	0.000
TI_t	***0.169***	0.112	0.085	***0.151***	0.233	0.108	0.082	0.047	0.092	0.151	***0.080***	0.071	0.028	***0.062***	0.111
$BTD\text{-}total_t$	***−0.016***	0.052	−0.041	***0.030***	0.002	0.014	0.030	−0.001	0.011	0.023	***0.056***	0.040	0.033	***0.047***	0.069

(*continued on next page*)

TABLE 2 (continued)

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[a] Sample size varies because some data necessary to compute the variables that are not included in the regressions are not available for all firm-years.

Bold font indicates that the amount is significantly different from the amount for the SmallBTD group. Italic font indicates statistical significance in the difference between the LPBTD group and the LNBTD group. All significance levels are at $p = 0.05$ or smaller.

$PTBI_{t+1}$ = pre-tax book income one-year-ahead (item #170);
$PTBI_t$ = pre-tax book income in the current year (item #170);
$PTCF_t$ = pre-tax cash flow for the current year (item #308 + item #317 − item #124);
$PTACC_t$ = pre-tax accruals for the current year (PTBI − PTCF);
DTE_t = deferred tax expense in the current year grossed up by statutory tax rate ((sum of items #269 and #270 and where missing item #50)/35 percent); (each of the above are shown scaled by average total assets and winsorized (reset) at the 1 percent and 99 percent);
$AVETA_t$ = average total assets for the firm (item #6) (in millions);
ROE_t = earnings (item #18)/average shareholders' equity (item #216);
MVE_t = market value of equity at fiscal-year end of year t (item #199 * item #25) (in millions);
BM_t = ratio of the firm's book value of equity to its market value of equity at time *t* (item #60/*MVE*);
SAR_t = size-adjusted return calculated as the buy-and-hold return of the security less the buy-and-hold return of a size-matched portfolio; return accumulation begins in the fourth month of fiscal year-end *t* to allow the dissemination of financial reports;
SAR_{t+1} = size-adjusted return calculated as the buy-and-hold return of the security less the buy-and-hold return of a size-matched portfolio; return accumulation begins in the fourth month after the fiscal year-end of *t* to allow the dissemination of financial reports;
$Beta_t$ = systematic risk estimated from regression of monthly raw returns on the return to a value-weighted market portfolio over a 60-month return period prior to the abnormal return accumulation period. Fifteen months of return data are required to calculate beta;
ETR_t = effective tax rate in year *t* (total tax/pre-tax book income (item #16/item #170);
$CETR_t$ = current effective tax rate (current tax expense/pre-tax book income ((item #16 − item #50)/item #170);
$Sales_t$ = sales in year *t* (item #12) (scaled by average total assets);
$SalesGrow_t$ = growth in sales from year t−1 to t ((item #12 in year t − item #12 in year t−1)/(item #12 in year t−1));
$NOAGrow_t$ = net operating assets in year t/net operating assets in year t−1 (item #2 + item #3 + item #68 + item #8 + item #33 + item #69 − item #70 − item #72 − item #75);
$Leverage_t$ = debt-to-equity ratio (item #34 + item #9/item #216);
$SpecItems_t$ = special items scaled by average total assets (item #17/average total assets);
TI_t = estimate of taxable income calculated as current tax expense grossed up by statutory tax rate; and
$BTD - total_t$ = estimate of total difference between book and taxable incomes (PTBI−TI), scaled by average total assets.

LPBTD (LNBTD) represents the group of firm-years with a deferred tax expense, positive book-tax differences, (deferred tax benefit, negative book-tax differences) in the top (bottom) quintile of firm-years in the sample. SmallBTD represents the group of firm-years not included in the groups LPBTD and LNBTD (i.e., firm-years with relatively small book-tax differences).

TABLE 3
Regression Results: OLS Regressions of Future Pre-Tax Earnings Performance on Current Pre-Tax Earnings Performance
(n = 14,106)

Panel A: Earnings Forecasting Equation

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + \upsilon_{t+1} \quad (1)$$

Variables	γ_0	γ_1	Adj. R^2
Estimate	0.003	0.678	0.267
t-stat	2.120**	71.620*	

Panel B: Earnings Forecasting Equation with Coefficients Allowed to Vary for Firm-Years with Large Book-Tax Differences

$$PTBI_{t+1} = \gamma_0 + \gamma_1 LNBTD_t + \gamma_2 LPBTD_t + \gamma_3 PTBI_t + \gamma_4 PTBI_t * LNBTD_t + \gamma_5 PTBI_t * LPBTD_t + \varepsilon_{t+1} \quad (2)$$

Variables	γ_0	γ_1	γ_2	γ_3	γ_4	γ_5	Adj. R^2
Estimate	−0.003	0.017	0.017	0.742	−0.100	−0.212	0.272
t-stat	−1.620	4.430*	4.000*	57.350*	−4.560*	−7.990*	

F-test of $\gamma_4 = \gamma_5$: 15.01 (p = 0.0001)

*, **, *** Denotes significance at the .01, .05 and .10 levels, respectively, using a two-tailed test.
All variables are defined as in Table 2.

coefficients representing the difference in the persistence of cash flows for both the large book-tax difference groups are significantly different from zero ($\gamma_4 < 0$ and $\gamma_5 < 0$). Thus, although I had no prediction for the cash flow interaction terms, it appears the firm-years with large book-tax differences have less persistent cash flows.[25]

Figure 1 shows the pre-tax earnings and accruals patterns for the sample firm-years with data available for the two years prior to the current year (where current year is the year used to rank the firm-years and place them into subsamples) and two years after the current year. Figure 1, Panel A shows that the LPBTD group has a larger increase and subsequent decrease in mean-scaled pre-tax earnings than do the other two groups of firm-years. Figure 1, Panel B provides even more striking results for pre-tax accruals. The subsample with large positive book-tax differences has a sharp increase in pre-tax accruals in the current year and a sharp decrease in pre-tax accruals in the following year.

In sum, the results for the H1 and H2 tests indicate that firm-years with large book-tax differences have lower earnings and accrual persistence consistent with these firm-years having a higher level of discretionary accruals that subsequently reverse. In supplemental tests described below, I investigate potential sources of this lower persistence.

The lower persistence in the cash flow component of earnings for the firm-years with large book-tax differences warrants further discussion. Although the information about earnings quality in temporary book-tax differences, if any, is not generally thought to be about the quality or persistence of cash flows, there are potential explanations *ex post* of why book-tax differences and the persistence of cash flows are associated. For example, firms likely manage earnings by managing cash flows in addition to managing accruals. Managing

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[25] I discuss this finding more fully below.

TABLE 4

Regression Results: OLS Regressions of Future Pre-Tax Earnings Performance on the Accrual and Cash Flow Components of Current Pre-Tax Earnings Performance

(n = 14,106)

Panel A: Earnings Forecasting Equation with Accrual and Cash Flow Components as Independent Variables

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTCF_t + \gamma_2 PTACC_t + \xi_{t+1} \quad (3)$$

Variables	γ_0	γ_1	γ_2	Adj. R^2
Estimate	−0.010	0.752	0.490	0.313
t-stat	−6.280*	79.550*	42.400*	

F-test of $\gamma_1 = \gamma_2$: 799.69 (p = 0.0001)

Panel B: Earnings Forecasting Equation with the Coefficients on the Accrual and Cash Flow Components of Current Earnings Performance Allowed to Vary for Firm-Years with Large Book-Tax Differences

$$PTBI_{t+1} = \gamma_0 + \gamma_1 LNBTD_t + \gamma_2 LPBTD_t + \gamma_3 PTCF_t + \gamma_4 PTCF_t * LNBTD_t + \gamma_5 PTCF_t * LPBTD_t + \gamma_6 PTACC_t + \gamma_7 PTACC_t * LNBTD_t + \gamma_8 PTACC_t * LPBTD_t + \varepsilon_{t+1} \quad (4)$$

Variables	γ_0	γ_1	γ_2	γ_3	γ_4	γ_5	γ_6	γ_7	γ_8	Adj. R^2
Estimate	−0.014	0.011	0.009	0.806	−0.083	−0.167	0.557	−0.115	−0.187	0.317
t-stat	−6.990*	2.880*	2.120**	62.510*	−3.790*	−6.200*	34.720*	−4.360*	−5.810*	

F-test of $\gamma_4 = \gamma_5$: 8.11 (p = 0.0044)

F-test of $\gamma_7 = \gamma_8$: 4.25 (p = 0.0393)

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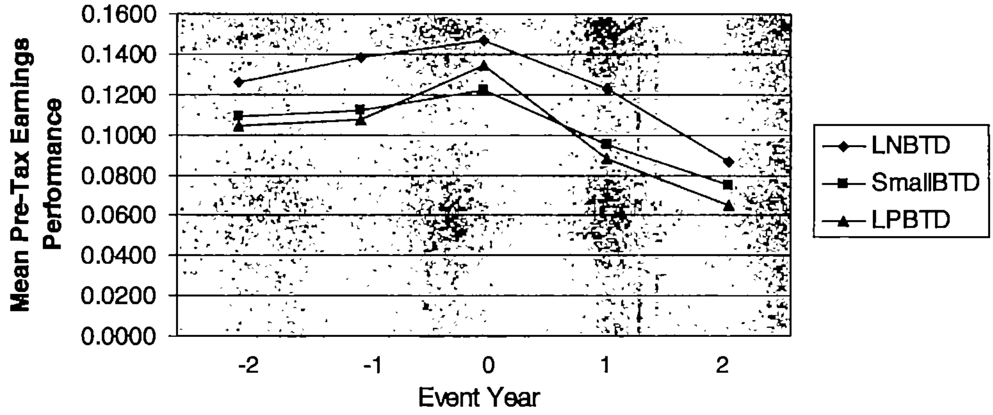
*, **, *** Denotes significance at the .01, .05 and .10 levels, respectively.
All variables are as defined in Table 2.

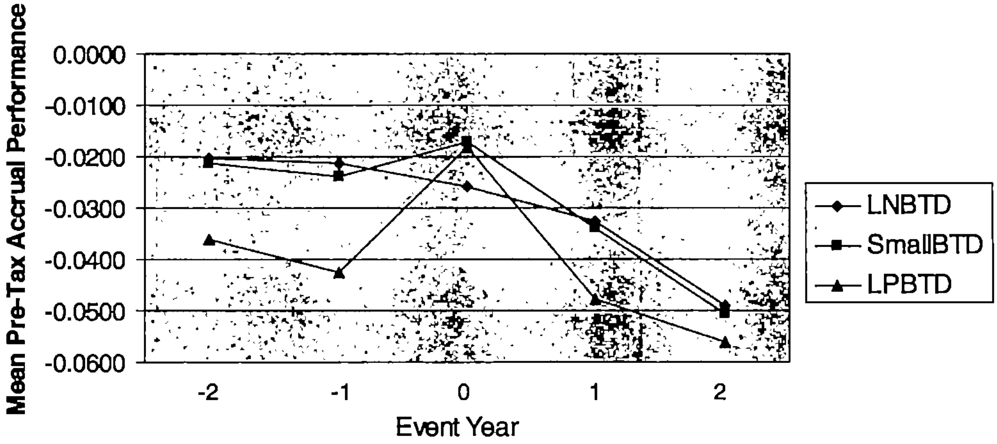
FIGURE 1

Graph of Pre-Tax Earnings Performance and Pre-Tax Accrual Performance for Each Subsample Based on the Level of Temporary Book-Tax Differences

Panel A



Panel B



Sample included in the figure are firm-years in the sample for the regressions that have nonmissing data for two years prior to the current year and two years after the current year (9,560 firm-year observations).

Pre-tax earnings is pre-tax book income (item #170) scaled by average total assets (item #6).

Pre-tax accruals is measured as pre-tax book income less pre-tax cash flow (item #108 − item #124 + item #317). LPBTD is the subsample of firm-years with large positive book-tax differences, LNBTD is the subsample of firm-years with large negative book-tax differences, and SmallBTD is the subsample of firm-years with relatively small book-tax differences.

cash flows would avoid the scrutiny of auditors and regulators more than accrual management. Burgstahler and Dichev (1997) present evidence on how firms accomplish earnings management around the 0 earnings level. They plot the 25th, 50th, and 75th percentiles of cash flows from operations (CFO) for each earnings interval and find that the distribution of CFO shifts upward in the first interval to the right of 0. They argue that this is evidence that firms manage the cash flow component of earnings upward to report small profits instead of losses. They also find similar evidence with accruals. Thus, there is evidence that firms manage both cash flows and the accruals components making both potentially less persistent when book-tax differences are large.[26]

Further, Graham et al. (2004) using survey responses from 401 financial executives provide evidence consistent with executives claiming that earnings are often managed through cash flows. For example, they find that 80 percent of survey participants report that they would decrease discretionary spending on research and development, advertising, and maintenance and more than half say they would delay starting a new project to meet earnings targets even if such a delay entails a small sacrifice in value. Thus, their findings provide further evidence that cash flows are also managed to achieve earnings goals.

Thus, while book-tax differences reflect discrepancies in the calculation of accruals between book and tax methods, high levels of book-tax differences will likely be associated with the persistence of cash flows as well because firms managing earnings through accruals are likely also managing cash flows. However, because the link between book-tax differences and accruals is more direct and because the claims in financial accounting textbooks, recent academic literature, and the press focus on the persistence (quality) of accruals, I base my *ex ante* predictions and tests on accruals rather than cash flows.

Tests of Hypotheses 3: Market Pricing When Book-Tax Differences Are Large

Table 5 presents the results of testing H3. I first present results of tests of the pricing of *total* pre-tax book income. The tests are performed using the Mishkin (1983) methodology. Panel A shows that investors appear to reduce their expectation of earnings persistence for firm-years in the LPBTD group. In fact, for this subsample, investors have an expectation of earnings persistence lower than the actual persistence of earnings $((\gamma_1^*/\gamma_1) < 1)$. Thus, when there are large positive book-tax differences, investors appear to recognize that these firm-years will not have persistent earnings and lower their expectation of earnings persistence. For the LNBTD group, investors have an expectation of the persistence of total pre-tax earnings that is consistent with the actual persistence. For the SmallBTD group, I find that total earnings persistence is underestimated.

Next I estimate the system of Equations (3) and (6) to allow the coefficients on the accruals and cash flow components to vary. The equations are again estimated using the nonlinear generalized least squares approach. Table 5, Panel B presents the results. The evidence is consistent with prior research (e.g., Sloan 1996; Xie 2001) for the full sample and for firm-years with small book-tax differences; investors appear to overestimate the persistence of the accrual component of earnings $(\gamma_2^* > \gamma_2)$ and underestimate the cash flow component of earnings $(\gamma_1^* < \gamma_1)$. For firm-years with large positive book-tax differences (book income in excess of taxable income), however, I find evidence consistent with the accrual component of earnings being priced rationally $(\chi^2 = 0.00, p = 1.00)$, consistent with H3, and the persistence of the cash flow component of earnings being underestimated (χ^2 statistic of 8.69, significant at $p = 0.0032$). For the sample of firm-years with large negative book-tax differences, investors overestimate the persistence of accruals, consistent

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[26] Roychowdhury (2003) investigates how firms accomplish the cash flow management when reporting small annual profits. He finds evidence consistent with firms avoiding losses by offering price discounts to temporarily increase sales, by overproduction to reduce reported cost of goods sold, and by reducing discretionary expenses to report higher margins.

TABLE 5
Regression Results: Nonlinear Generalized Least Squares Estimation (The Mishkin Test) of the Market Pricing of Pre-Tax Earnings with Respect to Its Implications for One-Year-Ahead Pre-Tax Earnings

Panel A: Market Pricing of Pre-Tax Earnings with Respect to Its Implications for One-Year-Ahead Pre-Tax Earnings

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + \upsilon_{t+1} \quad (1)$$

$$SAR_{t+1} = \alpha + \beta_1(PTBI_{t+1} - \gamma_0 - \gamma_1^* PTBI_t) + \varepsilon_{t+1} \quad (5)$$

	LNBTD (book income<tax income)		SmallBTD		LPBTD (book income > tax income)	
Parameter	**Estimate**	**Asymptotic Standard Error**	**Estimate**	**Asymptotic Standard Error**	**Estimate**	**Asymptotic Standard Error**
β_1	0.581	0.067	0.681	0.035	0.562	0.055
γ_1^* (*PTBI*)	0.699	0.127	0.533	0.058	0.272	0.125
γ_1 (*PTBI*)	0.642	0.021	0.742	0.012	0.530	0.023
Ratio (γ_1^*/γ_1)	1.088		0.718		0.513	

Tests of Rational Pricing of Pre-Tax Earnings

Null Hypothesis	**Likelihood Ratio Statistic**	**Marginal Significance Level**	**Likelihood Ratio Statistic**	**Marginal Significance Level**	**Likelihood Ratio Statistic**	**Marginal Significance Level**
$\gamma_1^* = \gamma_1$	0.542	0.4617	13.558	0.0002	4.330	0.0375

(*continued on next page*)

TABLE 5 (continued)

Panel B: Market Pricing of Earnings Components with Respect to Their Implications for One-Year-Ahead Pre-Tax Earnings

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTCF_t + \gamma_2 PTACC_t + \xi_{t+1} \qquad (3)$$

$$SAR_{t+1} = \alpha + \beta_1(PTBI_{t+1} - \gamma_0 - \gamma_1^* PTCF_t - \gamma_2^* PTACC_t) + \varepsilon_{t+1} \qquad (6)$$

	Full Sample		LNBTD		SmallBTD		LPBTD	
Parameter	Estimate	Asymptotic Stand. Error	Estimate	Asymptotic Stand. Error	Estimate	Asymptotic Stand. Error	Estimate	Asymptotic Stand. Error
β_1	0.606	0.282	0.545	0.069	0.669	0.036	0.545	0.057
γ_1^* (*PTCF*)	0.482	0.054	0.589	0.141	0.521	0.062	0.231	0.139
γ_1 (*PTCF*)	0.752	0.009	0.723	0.021	0.806	0.012	0.639	0.024
Ratio (γ_1^*/γ_1)	0.641		0.815		0.646		0.362	
γ_2^* (*PTACC*)	0.700	0.065	0.831	0.173	0.726	0.075	0.416	0.156
γ_2 (*PTACC*)	0.490	0.012	0.442	0.025	0.557	0.015	0.371	0.028
Ratio (γ_2^*/γ_2)	1.429		1.880		1.303		1.121	

Tests of Rational Pricing of Earnings Components

Null Hypothesis	Likelihood Ratio Statistic	Marginal Significance Level	Likelihood Ratio Statistic	Marginal Significance Level	Likelihood Ratio Statistic	Marginal Significance Level	Likelihood Ratio Statistic	Marginal Significance Level
PTCF: $\gamma_1^* = \gamma_1$	25.84	0.0001	1.073	0.3003	22.099	0.0001	8.693	0.0032
PTACC: $\gamma_2^* = \gamma_2$	10.69	0.0011	5.450	0.0196	5.260	0.0218	0.000	1.0000
All $\gamma^* = \gamma$	93.43	0.0001	13.620	0.0011	68.308	0.0001	19.540	0.0001

Equations (1) and (5) and (3) and (6) are estimated using iterative generalized nonlinear least squares estimation procedure based on 14,106 observations during 1994–2000.

All variables are defined as in Table 2.

with Sloan (1996) but inconsistent with H3, and appear to price cash flows rationally ($\gamma_1 = \gamma_1^*$).[27]

Overall, the results suggest that for firm-years with large positive book-tax differences either investors use the book-tax differences to infer lower persistence in accruals or the type of accruals that the book-tax differences are associated with are easily identified and priced by the market. However, the evidence also indicates that investors underestimate the persistence of the cash flow component for these firm-years suggesting that investors overweight the information in the book-tax differences. Conversely, for firm-years with large negative book-tax differences, the results indicate that investors overestimate the persistence of the accrual component of earnings, consistent with prior research examining broad cross-sections of firm-years (e.g., Sloan 1996).

Abnormal Returns Regressions

Table 6 presents the results of the annual return regression tests intended to complement the Mishkin (1983) tests of market rationality. As noted previously, I use only December year-end firms and estimate the regressions annually in order to estimate the returns to an implementable hedge portfolio strategy. I find that for the entire sample the abnormal return to an accrual-based strategy is 4 percent ($p = 0.046$). For firm-years with large negative book-tax differences, the return to an accrual investment strategy is marginally significant at the 0.10 level. Consistent with my Mishkin tests, I find that for firm-years with relatively large positive book-tax differences, an investment strategy based on the accrual component of earnings does not earn a significant return ($p = 0.16$). Thus, overall the regression tests support the results from the Mishkin (1983) test: in firm-years with large positive book-tax differences investors appear to price accruals rationally. This evidence is consistent with the large positive book-tax differences providing additional information to investors about the persistence of accruals.

Additional Analysis

An Investigation of the Specific Sources of Lower Persistence

The effect of special items. I examine the effect of special items on my results to determine if the persistence differences I find reflect aggressive reporting in current operating accruals or if the persistence differences are largely driven by transitory items below operating income (i.e., special items). Specifically, I perform the persistence tests in Equation (4) using the definitions of earnings, accruals, and cash flows as in Sloan (1996). Sloan (1996) defines earnings as operating earnings after depreciation (data item #178), which excludes the effects of special items. In my original tests I use total pre-tax earnings, which includes the effects of special items because the deferred tax expense number is related to the total pre-tax earnings number.

There is no way to separate the book-tax differences related to special items.[28] As a result, I assume that all special items create a book-tax difference and subtract the amount of special items for each observation from the amount of book-tax differences. I then use this adjusted measure of book-tax differences to partition the firm-years into subsamples

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[27] I have no explanation for why cash flows are priced correctly for this group of firms. However, the results are similar to those in recent studies. For example, in Bradshaw et al. (2001) the ratio of investor implied to observed persistence in cash flows is 0.97 (significance not reported) and Barth and Hutton (2004) report a ratio of 0.95 ($p = 0.362$) for one subsample of firms (those with consistent accrual and forecast revision signals) in their study.

[28] Hand collection would not reliably accomplish this task either as only material deferred tax assets and liabilities are required to be reported and changes in these are often affected by mergers and acquisitions and the taxes related to extraordinary items.

TABLE 6
Summary Regression Statistics of the Relation between Abnormal Stock Returns and Scaled Deciles of Accruals, Cash Flows, and Control Factors
December Year-End Firm-Years Only
(n = 7,497)

$$SAR_{t+1} = \beta_0 + \beta_1 PTACC_t^{dec} + \beta_2 \ln MVE_t^{dec} + \beta_3 \ln BM_t^{dec} + \beta_4 Beta_t^{dec} + \beta_5 EP_t^{dec} + \beta_6 SAR_t^{dec} + \varepsilon_{t+1} \quad (7)$$

		Full Sample		LNBTD		Small BTD		LPBTD	
n		7,497		1,401		4,432		1,664	
Parameter	Pred. Sign	Mean over the Years (n = 7)	Number of Years +/−	Mean over the Years (n = 7)	Number of Years +/−	Mean over the Years (n = 7)	Number of Years +/−	Mean over the Years (n = 7)	Number of Years +/−
Intercept	?	−0.071		−0.663		−0.475		−0.123	
	t-stat	−1.410	3/4	−1.182	2/5	−0.957	3/4	−1.733	0/7
	p-val	(0.207)		(0.282)		(0.378)		(0.134)	
$PTACC_t^{dec}$	−	−0.038		−0.035		−0.038		−0.041	
	t-stat	−2.496	2/5	−1.927	2/5	−2.182	2/5	−1.607	2/5
	p-val	(0.046)		(0.102)		(0.072)		(0.159)	
$lnMVE_t^{dec}$	−	0.039		0.020		0.026		0.058	
	t-stat	1.023	4/3	0.394	5/2	0.741	5/2	1.069	4/3
	p-val	(0.346)		(0.707)		(0.487)		(0.326)	
$lnBM_t^{dec}$	+	−0.015		−0.001		−0.046		0.033	
	t-stat	−1.210	3/4	−0.019	4/3	−2.713	2/5	1.497	3/4
	p-val	(0.272)		(0.986)		(0.035)		(0.185)	
$Beta^{dec}$	+	−0.004		0.005		−0.015		0.014	
	t-stat	−0.288	2/5	0.131	3/4	−1.100	3/4	0.553	3/4
	p-val	(0.783)		(0.901)		(0.313)		(0.600)	
EP_t^{dec}	+	0.416		0.050		0.039		0.053	
	t-stat	4.159	7/0	1.832	5/2	1.751	5/2	1.714	5/2
	p-val	(0.006)		(0.116)		(0.131)		(0.137)	
SAR_t^{dec}	+	0.064		0.033		0.074		0.079	
	t-stat	1.158	6/1	0.626	5/2	1.247	5/2	1.338	5/2
	p-val	(0.291)		(0.554)		(0.259)		(0.229)	

(continued on next page)

TABLE 6 (continued)

t-statistic (second number) is computed as the ratio of the mean of the annual coefficients to the standard error calculated from the distribution of annual coefficients.
p-values are in parentheses.

Variable Definitions:

SAR_{t+1} = size-adjusted return calculated as the buy-and-hold return of the security less the buy-and-hold return of a size-matched portfolio. Return accumulation begins in the fourth month after the fiscal year-end of *t* to allow the dissemination of financial reports;

$PTACC_t^{dec}$ = pre-tax accruals divided by average total assets, transformed to a scaled-decile variable with values ranging from 0 to 1;

$lnMVE_t^{dec}$ = the natural logarithm of the market value of common equity, transformed to a scaled-decile variable with values ranging from 0 to 1;

$lnBM_t^{dec}$ = the natural logarithm of the book to market ratio, transformed to a scaled-decile variable with values ranging from 0 to 1;

$Beta_t^{dec}$ = systematic risk estimated from regression of monthly raw returns on the return to a value-weighted market portfolio over a 60-month return period prior to the abnormal return accumulation period, transformed to a scaled-decile variable with values ranging from 0 to 1. Fifteen months of return data are required to calculate beta;

EP_t^{dec} = earnings-to-price ratio, transformed to a scaled-decile variable with values ranging from 0 to 1; and

SAR_t^{dec} = annual buy-and-hold raw return for the security less the buy-and-hold return to a size-matched portfolio of firms, for the year prior to the abnormal return accumulation period transformed to a scaled-decile variable with values ranging from 0 to 1.

and perform tests similar to those above. Although some of the results are weakened by excluding the effects of special items, I continue to find results consistent with firm-years with large book-tax differences having lower persistence in earnings, accruals, and cash flows. More specifically, I find in a regression analogous to Equation (4), but excluding special items from the variable computations, that firm-years with both large negative and large positive book-tax differences have a lower persistence in accruals relative to firm-years with small book-tax differences ($\gamma_7 = -0.096$ and $\gamma_8 = -0.075$). Both groups of large book-tax difference firm-years also have significantly lower persistence in cash flows as well ($\gamma_4 = -0.068$ and $\gamma_5 = -0.100$). Thus, while the results of this test appear to be somewhat weaker (i.e., the coefficients are smaller) indicating that the special items do have an effect, overall they are robust to the adjustment for special items.[29]

Examination of the disclosure of changes in deferred tax assets and liabilities. I hand-collect the changes in deferred tax assets and liabilities for a small subsample of firm-years in both the large book-tax differences groups to examine what types of book-tax differences are generating the deferred tax expense for these groups of firms. However, I provide a caveat to the examination of these data. One reason I use the deferred tax expense (income statement) number rather than the change in the deferred tax assets and liabilities in the formal tests above is that the change in the deferred tax assets and liabilities listed in the tax footnote does not always tie out to the deferred tax expense as one might expect. The changes in the deferred tax asset and liabilities in the notes to the financial statements can include changes resulting from merger and acquisition activity and changes related to deferred taxes attributed to income or losses from discontinued operations or extraordinary items. Thus, it is very difficult to identify the actual "components" of the deferred tax expense (income statement number) even when hand-collecting the data.[30] In the sample I have hand-collected, I find that in only 27 out of the 60 firm-years collected does the deferred tax expense tie out exactly to the change in the deferred tax assets and liabilities.

This caveat notwithstanding, I find that most of the change in the deferred tax assets and liabilities for firm-years with large positive book-tax differences is from the depreciation book-tax difference (or other differences that affect property, plant, and equipment) with the next largest categories including bad debt reserve, pensions and postretirement benefits, the category labeled "other," and investments in affiliates, partnerships, and unrealized security gains.

For firm-years with large negative book-tax differences the largest categories of change are reserves and accruals (both individually labeled and those called "miscellaneous" accruals), the line item labeled "other," and depreciation differences. The largest category, reserves and accruals, includes the accounts that are generally suspected of earnings management in the texts (warranty expense, miscellaneous reserves, etc.). This is consistent with this subsample's accruals having a lower persistence for future earnings as compared to the accruals for firm-years with small book-tax differences.[31]

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[29] I also perform another analysis to examine the effects of special items. I use the same definitions of earnings, accruals, and cash flows as in the original tests, but I use a sample that excludes all firm-years with material special items (defined as those firm-years with special items that are larger in absolute value than one percent of average total assets). I find that all the results are qualitatively similar to those found in the original tests with the exception of firm-years with large positive book-tax differences not having lower persistence in accruals relative to firm-years with small book-tax differences. Specifically, when I estimate Equation (4) over the subsample of firm-years without material special items, I find that the coefficient on the interaction of accruals and the indicator variable *LPBTD* is -0.040 ($p = 0.274$). Thus, this test would indicate a stronger effect of special items on the results. However, a caveat to this test is that it excludes approximately 2,900 observations and it may be the case that these observations with large special items are firms that manage earnings in other accounts as well.

[30] For further explanation see Revsine et al. (1999) and Hanlon (2003).

Scaler

My two research questions are (1) whether firm-years with larger book-tax differences have less persistent earnings and (2) whether the large book-tax differences influence investors' assessments of persistence. In looking at the first question, I follow prior research in using earnings performance (return on assets). However, recent research by Fairfield et al. (2003) argues that the persistence effect documented by Sloan (1996) is partially attributable to growth in operating assets (i.e., growth in the denominator rather than reversals in the numerator generate the results in the forecasting regressions). As a result, I re-estimate the above forecasting Equation (4) using total assets in year $t-1$ as the common scale for all variables in the regression. I find that the coefficient on the accrual interaction term for the LPBTD group continues to be negative and significant but that the coefficient on the accrual interaction term for the LNBTD group is not statistically significant. In order to further investigate this issue, I re-estimate the tests that use lagged assets as the common scaler in ranks and find that firm-years with both large positive and large negative book-tax differences have lower persistence in earnings and accruals as found in the original tests. Thus, these rank results suggest that the lagged asset deflator is a noisier measure of scale than average total assets and that the inferences of the original tests above are robust to the alternative scaler measure.[32]

Return on Equity as a Correlated Omitted Variable

I also investigate return on equity (ROE) as an omitted correlated variable in the earnings forecasting equation because firms with relatively high and low levels of return on equity are known to have less persistent earnings (Freeman et al. 1982). I include an interaction term of ROE times the scaled earnings variable in Equation (2). The coefficient for this interaction term is significantly negative (–0.428) consistent with higher ROE firms having more mean reverting income. However, the inferences with regard to the other variables are qualitatively similar suggesting the results are not caused by different levels of ROE.[33]

Book-Tax Differences as a Proxy for Discretionary Accruals

To further investigate the information in book-tax differences about future earnings, I separate my accruals measure into two variables—financial accounting accruals *excluding* book-tax differences and the temporary book-tax differences—and include both as independent variables in a regression of one-year-ahead earnings on accruals and cash flows. This regression uses book-tax differences as a proxy for discretionary accruals, in the spirit of Phillips et al. (2003), and then conducts a test similar to Xie (2001) of the relative persistence of nondiscretionary accruals as compared to discretionary accruals.

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[31] See Phillips et al. (2004) for further tests of hand-collected components of the temporary book-tax differences as they relate to earnings management, proxied in their tests by firms that just avoid an earnings decline.

[32] I thank Maureen McNichols for suggesting the rank regression tests in this case.

[33] I also conduct a sensitivity test including loss firms (i.e., both book and tax loss firms) and using an estimate of total book-tax differences (although this estimate is likely subject to much more measurement error as discussed previously in the manuscript). I estimate total book-tax differences by grossing up the current tax expense by the statutory tax rate (35 percent). The sample with available data consists of 29,101 firm-years. When annual return regressions are estimated there is not a significant association between abnormal returns and the book-tax differences consistent with investors realizing that income that is different between book and tax is less persistent.

In untabulated results I find that the coefficient on cash flows is 0.747, the coefficient on accruals *excluding* the book-tax differences is 0.481 (significantly different from the coefficient on cash flows, p-value on an F-test of 0.0001), and the coefficient on the book-tax differences is 0.402 (significantly different than the coefficient on accruals excluding book-tax differences, p-value of an F-test of 0.0005). Thus, these results are consistent with book-tax differences having lower persistence for one-year-ahead earnings than accruals *excluding* the book-tax differences, consistent with the book-tax differences proxying for discretion.

VII. CONCLUSIONS AND LIMITATIONS

The objective of my study is to investigate the role of temporary book-tax differences in: (1) indicating the persistence of earnings, accruals, and cash flows, and (2) influencing investors' assessments of the persistence of earnings and earnings components.

My results indicate that firm-years with large positive book-tax differences have lower earnings persistence than firm-years with small book-tax differences. This result is consistent with the common conjecture that when book income is far in excess of taxable income, earnings are of lower quality, if one accepts the definition of quality as persistence. Additional analysis suggests the results are robust to controlling for the effects of special (transitory) items.

My results also indicate that firm-years with large negative book-tax differences have significantly less persistent earnings, accruals, and cash flows. This lower earnings persistence is also robust to the adjustment for special items and, from the results of additional analyses, appears to be due to these firms having accruals of the type that are easily managed (e.g., warranty expense, miscellaneous reserves, etc.). Thus, even though negative book-tax differences are not the focus of textbook claims about using tax disclosures to assess earnings quality, large negative book-tax differences are associated with accruals that have lower persistence for future earnings.

Finally, I investigate the markets' use of book-tax differences in assessing the persistence of earnings. Although the evidence is somewhat mixed, I find results consistent with the market assessing a lower expectation of earnings persistence for firm-years that have large positive book-tax differences, suggesting that investors interpret this information as a "red flag" about current earnings quality or can more easily price the type of accruals common to these firm-years. Investors appear to correctly assess the persistence of the accruals component of earnings for these firm-years, but underestimate the persistence of cash flows. For firm-years with small book-tax differences and large negative book-tax differences, investors appear to overestimate the persistence in the accruals component of earnings, consistent with prior research. Overall, it appears that book-tax differences influence investors' perceptions of earnings persistence, but large book-tax differences do not fully aid investors in their assessment of the persistence of earnings or its components because for each group of firm-years (i.e., firm-years with large positive book-tax differences, firm-years with large negative book-tax differences, and firm-years with small book-tax differences) return inefficiencies remain.

There are several limitations and caveats to this study. First, the limited sample size and time period inhibits generalizing the results to other samples and time periods. However, the limitation in time is necessary so that the accounting for income taxes is consistent over the sample period. The limitation on sample size (omission of loss firms) is necessary as well in order to obtain a deferred tax number that can be interpreted as representing true book-tax differences. The results of the market rationality tests should be considered in light of my sample selection process.

Second, for the main tests, I partition the sample based on the level of temporary book-tax differences and investigate the relative earnings persistence between groups. To the extent there are omitted correlated variables that cause the firm-years to be partitioned similarly, these other factors could be contributing to my results. However, tests of industry, scale (growth), and return on equity indicate that the results are robust to these controls.

My findings lend support to the case being made by some in Congress for requiring additional tax disclosure by firms. Large book-tax differences as disclosed in the financial statements appear to provide information about the persistence of current earnings performance and have predictive power for future earnings. In addition, it appears that investors assess different persistence expectations for firm-years with large book-tax differences. More complete disclosure of the book-tax differences (such as more detailed disclosure of the components of the change in deferred tax assets and liabilities and a reconciliation of the total change to the deferred tax expense) would likely provide additional information that would help investors assess the information in book-tax differences.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 167–188

The Combined Effect of Wages and Firm Profit on Employee Effort

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ABSTRACT: This study investigates whether paying higher wages motivates employees to provide higher effort and whether firm profit moderates this relation. Consistent with gift exchange (Akerlof 1982) and reciprocity (Rabin 1993) models, my experimental results show that workers provided more effort when they were paid higher wages even though there was no *ex post* financial reward for doing so. Moreover, firm profit influenced the relation between wages and effort. Workers provided higher effort when firm profit decreased compared to when it increased. This suggests that the degree of reciprocity is affected by firm profit. However, workers' responded asymmetrically to firm profit, in that they behaved as if they expected to share in firm profit increases but not decreases. Although firms were fairly adept at predicting the profit-maximizing wage strategy, they apparently did not anticipate workers' reluctance to share in firm profit decreases.

Keywords: *reciprocity; implicit contracts; social preferences; experimental markets.*

Data Availability: *Contact the author.*

I. INTRODUCTION

Stimulated in part by Akerlof's (1982) gift exchange model, in which employees are motivated by reciprocity, there has been growing interest in investigating reciprocity in the experimental economics literature. Reciprocity is the notion that people care about the intentions of others and repay kind acts with kindness and unkind acts with revenge (Rabin 1993; Fehr and Falk 2002). Numerous studies have shown that many individuals are motivated by reciprocity and are willing to reward kind actions and punish unkind actions even though they incur a cost to do so. This behavior may result in efficiency gains that would not be sustainable if the parties acted in a purely selfish manner. In fact, Fehr and Gachter (2000) argue that incomplete contracts are widespread in the labor market

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This study is part of my dissertation. I am grateful for the advice and encouragement from my committee: Jacob G. Birnberg, John H. Evans III, John H. Kagel, Dhinu Srinivasan, and especially my chair, Donald V. Moser. This paper has benefited from the helpful comments of Steve Butler, Ken Cavalluzzo, Doug DeJong, Natalia Kotchetova, Joan Luft, Galen Sevcik, Geoff Sprinkle, Kristy Towry, three anonymous reviewers, and the workshop participants at the University of Arkansas, University of Florida, Georgia State University, The University of Iowa, Northeastern University, University of Oklahoma, University of Pittsburgh, Washington University in St. Louis, the 2000 AAA Annual Meeting, and the 2001 Frank Batten Young Scholars Forum hosted by The College of William & Mary. I also appreciate financial support from the Deloitte & Touche Foundation, the University of Pittsburgh's Provost Development Fund, and the Robinson College of Business.

Editor's note: This paper was accepted by Marlys Lipe, Editor.

Submitted October 2001
Accepted June 2004

because reciprocity, which relies on voluntary cooperation, is a powerful effort-elicitation mechanism.

My study extends the earlier work by examining whether an accounting variable, firm profit, affects the degree of reciprocity. In my experimental setting, firm-participants set wages and worker-participants responded with effort. Both the cost of effort to the worker and the returns to the firm increased in effort. Firm profit was manipulated via exogenous shocks to "other income," after which firms could revise wages and workers could revise their effort. In order to isolate the effects of reciprocity from economic incentives, the setting precluded contracting on effort and reputation formation. As a result, the economic incentive of firms and workers was to pay minimum wages and perform minimum effort, respectively. Moreover, if firms and workers were motivated solely by economic incentives, firm profit would have no effect on either wages or effort.

Results show that workers who were paid higher wages reciprocated with higher effort, in both the initial wage and in subsequent wage revisions after the profit shock. Moreover, reciprocity was affected by firm profit. That is, conditional on wage change, worker effort was higher when profit decreased compared to when it increased. This suggests that firm profit influences employees' perceptions of how much effort is appropriate in reciprocation for their wages.

Further, workers behaved as if they were entitled to share in firm profit increases but not decreases. Consistent with the notion of sharing in firm profit increases, when profit increased, firm participants tended to increase wages and workers reciprocated by increasing effort. However, if firms did not increase wages in response to profit increases, workers punished them by decreasing effort. When profit decreased, firms tended either to not change or to decrease wages. Workers reciprocated unchanged wages by increasing effort slightly. However, consistent with the notion that workers believed they should not share in firm profit decreases, firms that decreased wages when profits decreased were punished by decreased effort. Although firms were fairly adept at predicting the profit-maximizing strategy of increasing wages in response to wage increases, many firms apparently did not anticipate workers' reluctance to share in firm profit decreases. Therefore, they decreased wages when profit decreased even though this was the least profitable strategy.

These findings have potential implications for two streams of accounting research. First, the finding that firm profit influences worker effort relates to the literature that investigates earnings management directed at employee stakeholders (Liberty and Zimmerman 1986; DeAngelo and DeAngelo 1991; Bowen et al. 1995). If increased profit raises employees' expectations regarding appropriate wage increases, this could either increase labor costs if the firm meets the wage expectations or decrease labor productivity if the firm does not meet the wage expectations and employees decrease effort in response. Therefore, firms may want to consider these potential costs when making discretionary accounting choices that affect reported profit.[1]

The findings of this study also have implications for the contracting stream of accounting literature. From a narrow perspective, as discussed above, they suggest that firms may want to consider how firm profit affects employment relationships that rely on reciprocity to motivate their employees. From a broader perspective, my study adds to the growing evidence of the usefulness of socially mediated rewards in motivating and controlling employees (Sprinkle 2003). The complexity of tasks and the difficulty of measuring an employee's contribution to output make it difficult to rely exclusively on pecuniary incentives to motivate employees (Bewley 1999; Simon 1991). This difficulty is likely to be exacerbated by the recent trend toward a leaner, empowered work force. Whereas there is little doubt that most employees respond to pecuniary incentives, in my study, workers who received higher pay reciprocated with higher effort even though their pay was not contingent on performance. This suggests that the typical agency approach to contract design, which assumes that any utility derived from nonpecuniary factors would have a trivial impact on behavior, may result in contracts that are inefficient compared to alternatives that incorporate a broader set of behavioral factors. By demonstrating that employees respond to wages and firm profit in systematic and significant ways, this study contributes to the integration of behavioral and economic factors to provide insights to the accounting literature. As such, this study responds to the many recent calls for such integration (Waller 1994; Young and Lewis 1995; Kachelmeier 1996; Luft 1997; Moser 1998; Bonner et al. 2000; Bonner and Sprinkle 2002; Sprinkle 2003).

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[1] The fact that implicit contracts with employee stakeholders may be affected by reported profit does not imply that other costs and benefits are unimportant for managers to consider. Rather, employee reactions to reported profit may be one of several factors that firm management considers when evaluating discretionary accounting choices.

II. BACKGROUND LITERATURE AND HYPOTHESES

Akerlof (1982) developed an analytical model, called the gift exchange model, in which wages and effort are viewed as mutually reciprocal gifts. Like conventional agency models, Akerlof's gift exchange model assumes that workers have utility for wealth and disutility for effort. However, in contrast to conventional agency models, the gift exchange model assumes that workers also have utility for reciprocity. Workers make a gift of effort above the level enforceable by explicit contractual mechanisms in exchange for a gift of wages above the market clearing level. In effect, the firm and worker enter into an implicit contract whereby the firm pays higher wages *ex ante* in exchange for higher effort *ex post*. Thus, higher wages motivate workers to provide higher effort even though they anticipate no *ex post* reward for (or penalty for not) doing so.[2]

Prior empirical studies have found results that are consistent with gift exchange. Archival (Wadhwani and Wall 1991; Levine 1992; Huang et al. 1998) and field (Raff and Summers 1987) studies have found that increased wages are associated with increased productivity. Field (Groshen and Krueger 1990; Rebitzer 1995) and survey (Osterman 1994) studies have found that higher wages are associated with lower levels of supervision. Experimental studies (e.g., Fehr et al. 1993, 1996; Fehr and Schmidt 2000; Fehr and Gachter 2001; Hannan et al. 2002; Charness 2004) have found evidence of gift exchange in environments that are able to control for competing explanations of firm and worker behavior.

The current study adapts the basic experimental design developed by Fehr et al. 1993. Hypothesis 1a, which predicts a positive relation between wages and effort without regard to any moderating effect of firm profit, represents a replication of previous experimental findings:

> **H1a:** In the initial contract period, workers provide higher effort when they are paid higher wages even though they know they will receive no *ex post* reward for doing so.

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[2] Although I rely on gift exchange and reciprocity theories to develop the hypotheses, fairness theories (Adams 1965; Walster et al. 1973) would make similar predictions. In addition, several economic models include utility for fairness (e.g., Bolton 1991; Fehr and Schmidt 1999; Bolton and Ockenfels 2000).

In previous gift exchange studies, firms and workers were anonymously re-matched each time a wage was offered and an effort level was determined. This procedure controls for worker reputation effects. The current study differs from prior studies because, for a subset of periods, firms set a wage and workers choose an effort level twice within each period before being anonymously re-matched. This design still controls for worker reputation effects because only the stage two effort level is observable by the firm. Hypothesis 1b predicts that the relation between wages and effort will be robust to a repeated interaction between the firm and worker pair.

> **H1b:** After repeated interaction between the firm and worker, workers provide higher effort when they are paid higher wages even though they know they will receive no *ex post* reward for doing so.

Akerlof's gift exchange model is consistent with Rabin's (1993) more general model of reciprocity. According to Rabin's model, people reward kind intentions and punish unkind intentions, even though it may be costly to do so. People engage in reciprocity even in the absence of any expectation of future interactions or material benefits because they have a social preference for being treated kindly, and therefore have utility for increasing (decreasing) the payoff of people who treat them kindly (unkindly). The notion of reciprocity suggests that employees may provide more effort if they perceive that the firm treats them kindly with respect to wages and raises.

Anecdotal evidence suggests that employees' perceptions of a firm's intentions are likely to be influenced by the amount of firm profit. The notion that employees deserve to share in firm profit is a long-standing and widely held view. For example, more than 100 years ago Marshall (1887, reprinted in Pigou 1956, 217) observed that when product demand increases, "as a general rule employers will be bound in fairness to yield at once in such a case a considerable part of their new profits in higher wages;" over 50 years ago Hepworth (1953) proposed that a sharp increase in reported earnings would likely make employees feel that they should share such profit, leading to demands for wage increases; and a recent labor economics text observes "it is often considered unfair if a highly profitable employer is ungenerous in 'sharing' its good fortune with its workers, even if the wages it pays are relatively high" (Ehrenberg and Smith 1997, 396). The sentiment that employees deserve to share in firm profit is also widespread in the popular press (e.g., Schmidt 1997; McAllister 1998; Mandel 1999). Archival data studies, which have found that firm profit and employee wages are positively correlated (e.g., Slichter 1950; Dickens and Katz 1987; Groshen 1991; Carruth and Oswald 1989; Hildreth and Oswald 1997), suggest that firms do share profit with employees.

If firm profit influences employees' perceptions regarding the generosity of their wages or raises, then reciprocity predicts that firm profit may also influence perceptions of the appropriate effort response. Firms that are meager in sharing their profit may be viewed as behaving unkindly, and consequently, employees may be motivated to punish them by withholding effort. Similarly, firms that are generous in sharing profits may be viewed as behaving kindly, and therefore, employees may reciprocate by increasing effort, even though effort is costly to the employee.

Perceptions of intentions are affected by framing (Fehr and Falk 2002), which suggests that changes in wages may be a stronger focal point than the absolute wage level when employees evaluate the firm's intentions regarding a wage-adjustment decision. Because earnings announcements typically report the change in profit from the prior period, they provide a salient referent for employees to evaluate their wage adjustment by comparing it to the profit change. For example, an employee receiving a 4 percent pay increase is likely to perceive the intentions of the firm less favorably if the firm had a 20 percent *increase* in profit compared to a 20 percent *decrease* in profit.

In the current study, firms offer an initial wage, but then are allowed to adjust the wage after an exogenous profit shock (increase or decrease). Likewise workers choose an initial level of effort (unobserved by the firm), but then are allowed to revise their effort after receiving the stage two wage from the firm. Consistent with this experimental design, Hypothesis 2 is written in terms of wage and effort *changes* rather than wage and effort *levels*:

> **H2:** For a given wage change, effort change is greater when firm profit decreases compared to when firm profit increases.

Research Questions 1a and 1b investigate whether there is asymmetry in the magnitude of effort response to wage decreases compared to wage increases. Research Question 1a relates to worker behavior when firm profit increases. When firm profit increases, reciprocity predicts that workers whose wages are decreased will decrease effort in response to the unkind intentions of the firm. Moreover, there is some evidence that the magnitude of the effort decrease for wage decreases will be greater than the magnitude of the effort increase in response to wage increases. First, Offerman (2002) finds that participants respond much more strongly to unkind intentions compared to kind intentions, and therefore, are more likely to punish than to reward. Although Offerman's (2002) experiment was not designed to compare whether the *magnitude* of a punishing response differed from the *magnitude* of a rewarding response, it is likely that the stronger emotional response to unkind behavior that led to a *greater propensity* to punish, will likely lead to a *greater magnitude* of punishment as well. Second, studies have found that individuals devise fairness rules that are biased toward increasing their own payoffs (Messick and Sentis 1979; Loewenstein et al. 1993; Babcock et al. 1996). This suggests that, in the current study, workers may devise rationalizations for firm intentions so that they are biased toward minimizing deserved rewards and maximizing deserved punishments. If workers engage in such biased rationalizations, the magnitude of effort increase for wage increases will be lower than the magnitude of effort decreases for wage decreases because the former is more costly for the worker. This leads to the following research question:

> **RQ 1a:** When firm profit increases, is the magnitude of workers' effort change equal for wage decreases compared to wage increases?

When firm profit decreases, reciprocity predicts that workers whose wages are increased will increase effort in response to the kind intentions of the firm. However, it is less clear how workers will respond to wage decreases when firm profit decreases because it is unclear how workers perceive the intentions of firms in this case.[3] If intentions are viewed as neutral because the firm is merely sharing its loss with its worker, then effort should not change. If intentions are viewed as unkind, then workers will punish the firm by decreasing effort. The tendency of individuals to devise biased rationalizations to benefit themselves, discussed above, suggests that workers may in fact decrease effort when wages decrease, even though firm profit has also decreased. However, it is difficult to predict how the magnitude of any effort decrease in response to wage decreases would compare to the magnitude of effort increase in response to wage increases. If workers behave symmetrically to intentions, then the magnitude of effort increase should be greater because clearly the intentions of a firm that increases wages when profit decreases are much kinder compared to the unkind intentions from sharing losses. If workers behave asymmetrically to intentions, as Offerman's (2002) results suggest, than the magnitudes may be equal or even favor effort decreases. This leads to the second research question:

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[3] Anecdotal evidence suggests that workers believe they are entitled to share in firm profit increases but should not be held accountable for firm profit decreases (Reynolds et al. 1991, 424). Therefore, workers may decrease effort in response to wage decreases, even though firm profit has also decreased.

RQ 1b: When firm profit decreases, is the magnitude of workers' effort change equal for wage decreases compared to wage increases?

III. EXPERIMENTAL DESIGN

The hypotheses and research questions described above are tested using a laboratory experiment in which firm and worker participants interacted anonymously in an experimental labor market for 12 periods.[4] Firms made wage offers, which workers could accept or reject, and then workers who had accepted wage offers chose an effort level. Profit shock (positive or negative) was manipulated within experimental sessions via a random draw each period. Firms were permitted to revise wages as a result of a profit shock and workers were then permitted to revise their effort levels. The cost of worker's wages was deducted from firm profit, but higher levels of effort increased firm profit. Therefore, firms only benefited from paying higher wages if workers reciprocated with higher effort. Workers earned their wages less the cost of effort, with the cost of effort increasing in effort level. Consequently, workers had a financial incentive to always choose minimum effort.

An experimental approach rather than archival or field study was used to examine the issues of interest in this study because this approach provided greater control over the independent variables and better measurability of all variables. The experimental design precluded reputation formation, and workers could not be rewarded or punished based on their effort. Because workers had no explicit or implicit financial incentive to provide effort above the minimum level, observations of higher effort levels can be clearly attributed to reciprocity. Likewise, because the level of firm profit was manipulated experimentally while all other variables were held constant, differences in firm and worker behavior across profit shocks can be clearly attributed to differences in firm profit.

Participants

Sixty-four M.B.A. students participated in the study in six separate experimental sessions. Five sessions were conducted with six workers and five firms. Due to participant availability, one session was conducted with five workers and four firms.[5]

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[4] Participants were used to make decisions on behalf of the firm to improve the saliency of the firm's intentions for worker-participants. Charness (2004) finds that the slope of the effort-wage relation is significantly steeper when the wage is chosen by a firm-participant than when the wage is determined by the experimenter. This suggests that, consistent with Rabin's (1993) model, perceived intentions affect the effort response.

[5] Each session included one more worker than the number of firms in order to increase the competition among workers for wage offers and therefore increase the likelihood that low wage offers would be accepted. Consequently, the additional worker works against observing the higher wages that would be consistent with reciprocity and H1a.

Experimental Parameters and Economic Environment

The experiment did not permit firms to contract on effort *ex ante* even though it was observable *ex post*. Although this restriction is artificial, the experiment was designed to provide information about firm and worker behavior in situations where effort is either not observable or not contractible. This approach is similar to that used in analytical models that examine the role of reputation on manager's reports or decisions (e.g., Holmstrom and Ricart i Costa 1986; Kanodia et al. 1989; Sridhar 1994). In these models, the manager's wage for a given period does not depend on firm outcomes or the manager's report. Other analytical models (e.g., Baiman and Rajan 1995; Baiman and Verrecchia 1995; Sridhar and Magee 1997) have assumed that a manager's actions may be observable but not contractible.

The firm's profit function and the worker's income function are consistent with those used in other experimental gift exchange studies. The profit shock manipulation is unique to this study, however. Firm profit (delineated in an experimental currency, "lira") was a function of wage, effort, and other income, and was strictly increasing in effort. Specifically:

$$\text{firm profit} = ((120 \text{ lira} - \text{wage}) \times \text{effort}) + \text{other income}, \quad (1)$$

where:

wage $\in \{20, 21, 22, \ldots, 120\}$ was determined by the firm;
effort $\in \{0.1, 0.2, 0.3, \ldots, 1.0\}$ was determined by the worker;
other income $=$ 15 lira $+$ profit shock;
profit shock $= \{x, 0, -x\}$ with 1/3 probability of each; and
$x = 10$ or $x = 20$, depending on experimental session.[6]

Worker income was determined as follows:

$$\text{worker income} = \text{wage} - \text{cost of effort level} - 20 \text{ lira}. \quad (2)$$

The worker's income function included the -20 lira term so that the market clearing wage would be 20 lira rather than 0. To ensure that workers did not earn negative income, wages below 20 lira were not permitted.

As shown below, the cost of effort was a convex function that reflected an increasing marginal disutility for effort.

Cost of Worker's Effort

Effort level	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Cost (in lira)	0	1	2	4	6	8	10	12	15	18

Given the experimental parameters described above, the conventional economic prediction is that workers will always choose minimum effort (0.1). This prediction reflects the fact that effort above the minimum level is costly, and workers can not be rewarded *ex post* for higher effort levels either explicitly via an incentive contract or implicitly via reputation. Further, because workers will always provide minimum effort, firms maximize profit by offering wages of 20 to 25 lira (due to rounding in the earnings spreadsheet, described later, the firm would be indifferent between paying any wage between 20 and 25 lira). Paying higher wages merely transfers wealth from the firm to the worker.

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[6] Two levels of profit shock were used in the experiment in order to investigate whether workers' effort is sensitive to the level as well as the direction of a firm's profit change.

Pareto improvements are possible for wages between 26 lira and 110 lira so long as workers provide higher effort levels in response to higher wages. However, as discussed above, no Pareto improvement is predicted under conventional economic theory. In contrast, reciprocity predicts that Pareto improvements are attainable even in the absence of an explicit incentive contract and reputation effects. Specifically, reciprocity predicts that firms will offer wages above 25 lira because they expect workers to reciprocate by increasing effort. Pareto improvements are then possible if workers increase their effort in response to higher wages, as firms expect.[7]

Conventional economic assumptions and reciprocity also predict different effects for the profit shock manipulation. Conventional economic theory assumes that workers will always choose minimum effort (0.1). Therefore profit shocks will affect neither worker effort nor firms' wages, and all effort-change and wage-change observations will equal 0. In contrast, as reflected in H2, reciprocity predicts that workers will choose greater effort when firm profit has decreased compared to when firm profit has increased.

Experimental Procedures

Six experimental sessions were conducted, each lasting slightly less than two hours. Participants were randomly assigned as either a firm or worker when they arrived for their session. Each participant received a copy of the instructions, which were read aloud by the experimenter at the start of the experiment. Each participant was also provided with an earnings spreadsheet that indicated firm and worker earnings for all possible wage and effort combinations. Participants were able to refer to this earnings spreadsheet throughout the experiment. The experiment began after all questions had been answered and all participants had passed a short quiz demonstrating that they could properly use the earnings spreadsheet.

Each experimental session lasted 12 periods, with each period consisting of three stages. As shown in Figure 1, stage one of each period began with each firm privately submitting one wage offer (Figure 1, Box 1a), which was posted publicly without identifying the specific firm. Workers then had the opportunity to accept a wage offer (1b), with the restriction that each wage offer could be accepted by only one worker. Workers continued to accept a wage offer until either all of the wage offers had been accepted or all of the workers had had a chance to accept a wage offer.[8] In stage one, a firm was not permitted to revise its wage offer even if no worker accepted it. Firms and workers without accepted wage offers earned nothing for that period. After each worker had accepted a firm's wage offer (or refused all offers), each employed worker chose an effort level (1c). Initial wage and initial effort data from stage one are used to test H1a.

At the end of stage one, a random draw determined whether firms' other income for that period increased (a positive profit shock), decreased (a negative profit shock), or stayed the same (zero profit shock), with each state occurring with 1/3 probability (1d). The draw was performed publicly, and pertained to all firms. If the random draw indicated a zero profit shock, stage two was skipped and the initial wage and initial effort from stage one were binding (3a). If the random draw indicated a nonzero profit shock, firms and workers

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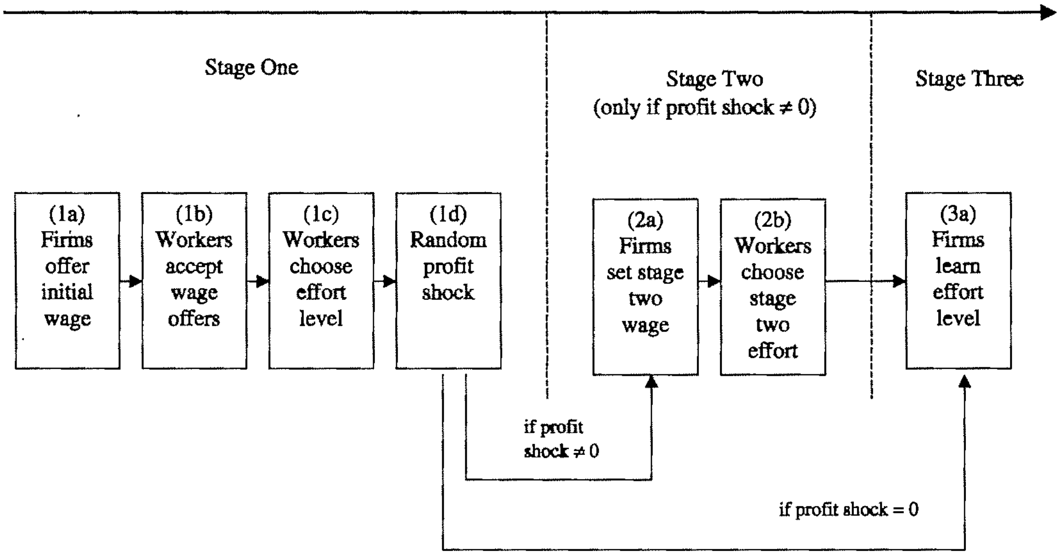
[7] Pareto improvements are possible. However, there is no specific wage-effort combination that results in both maximum total efficiency and maximum individual payoffs.

[8] The order in which individual workers had the opportunity to accept a wage offer was determined via a random-block procedure. That is, over the course of the experiment each worker went first twice, second twice, and so on, but the order in which this occurred was determined randomly.

FIGURE 1
Experiment Time Line


Stage One
Stage Two
(only if profit shock ≠ 0)
Stage Three
(1a) Firms offer initial wage
(1b) Workers accept wage offers
(1c) Workers choose effort level
(1d) Random profit shock
(2a) Firms set stage two wage
(2b) Workers choose stage two effort
(3a) Firms learn effort level
if profit shock ≠ 0
if profit shock = 0

were permitted to revise their stage one decisions in stage two. In that case, each firm communicated to its worker the stage two wage, which the worker was required to accept (2a). Stage two wages were private information, known only to the firm and its worker. Each worker then chose his stage two effort level (2b). Stage two wages and stage two effort levels are used to test H1b. Changes in wages and changes in effort levels between the first and second stages are used to test H2 and to investigate RQs 1 and 2.[9]

In stage three, firms learned their workers' effort level (3a) for *either* stage one or stage two, whichever was applicable. Effort level was revealed only to the firm that had employed the worker. Therefore, each firm and worker pair knew each other's payoff but not the payoff of any other participant. Earnings for both firms and workers were based on the stage two wage and stage two effort level if stage two had occurred; otherwise earnings were based on the initial wage and initial effort level from stage one. At the end of the experiment, all participants were paid their earnings for the 12 periods by converting lira to dollars at the rate of 15 lira = $1.00. Payment was made in private. Workers completed a post-experimental questionnaire.

Several procedures were used to ensure anonymity during the experiment. Firms and workers were assigned to seats on opposite sides of the room and were separated by a screen. Although initial wages were public information, participants did not know which firm made the wage offer because each firm was identified only by a number that changed each period. Workers' effort levels were also private. Each worker's effort level was communicated only to that worker's firm and workers were identified only by a number that changed each period. In addition, workers accepted wage offers by indicating the appropriate firm number via a show of fingers so that firms could not recognize a worker's voice.

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[9] Although making initial wages and effort binding with 1/3 probability reduced the number of wage-change and effort-change observations for testing H2, doing so increased the reliability of initial wage and initial effort data. If initial decisions had not been binding with some probability, there would have been no incentive for participants to take them seriously, which would have reduced the validity of the initial wage and initial effort data. A potential concern with permitting wage revisions only for nonzero profit shocks is that this may have signaled to participants that they should revise wages. To mitigate this possibility, the voluntary nature of wage (and effort) revisions was emphasized during the experiment. Apparently this was effective because 32 percent of stage two wages involved no revision.

IV. RESULTS

Tests of Hypotheses 1a and 1b

Hypotheses 1a and 1b predict that, in exchange for higher wages, workers provide higher effort levels in stage one and stage two, respectively. Table 1 reports mean wage and mean effort, along with the correlation between wage and effort, for each period. Referring first to stage one data, mean initial wage is 65.4 lira and mean initial effort is 0.32. These are well above the minimum levels for wages (25 lira) and effort (0.1) predicted by conventional economic theory ($t_5 = 15.47$, $p < .001$, and $t_5 = 7.04$, $p < .001$, respectively, using experimental session as the unit of analysis). Further, consistent with H1a, the correlations are statistically significant for ten of the 12 periods, and marginally significant for two of the 12 periods, indicating that effort increases in wages. Referring to stage two data, mean wage (64.9 lira) and mean effort (0.31) are about the same as in stage one, suggesting that the overall level of reciprocity was about the same across the two stages (although the standard deviations are slightly higher in stage two). In addition, consistent with H1b, the correlations between wage and effort in stage two are statistically significant in ten of the 12 periods.

TABLE 1
Mean Wage and Mean Effort by Period

	Stage One Data				Stage Two Data			
Period	n	Initial Wage	Initial Effort	Spearman Correlation	n	Stage Two Wage	Stage Two Effort	Spearman Correlation
1	29	62.3	.37	.268[c]	14	67.9	.31	.498[b]
2	29	62.2	.35	.802[a]	24	65.7	.20	.648[a]
3	29	64.8	.33	.494[a]	19	68.4	.17	.171
4	28	63.0	.34	.687[a]	20	58.0	.24	.836[a]
5	29	67.8	.28	.443[a]	29	66.0	.22	.545[a]
6	29	68.6	.36	.668[a]	19	61.6	.21	.746[a]
7	29	65.1	.29	.554[a]	24	67.2	.23	.642[a]
8	29	63.1	.28	.266[c]	20	68.5	.22	.188
9	27	67.2	.30	.590[a]	27	61.7	.27	.700[a]
10	28	65.7	.30	.521[a]	24	67.0	.26	.417[b]
11	28	68.5	.32	.630[a]	19	69.2	.25	.760[a]
12	29	67.1	.28	.433[a]	24	60.0	.22	.465[b]
Overall Mean (standard deviation)		65.4 (17.5)	.32 (.22)			64.9 (21.8)	.31 (.23)	

[a] Significant at $p < .01$ (one-tailed).
[b] Significant at $p < .05$ (one-tailed).
[c] Significant at $p < .10$ (one-tailed).

Table 1 also shows that wages and effort are fairly stable across the 12 periods. Notably, there is no dramatic drop in period 12, and the correlation between wage and effort are statistically significant for both stage one and stage two in period 12. The persistence of above-minimum effort levels in period 12 is important because it indicates that workers were not providing higher effort in earlier periods merely to keep wages high in future periods, as obviously there would be no incentive to provide higher effort in the final period. Likewise, firm participants must have believed workers would not decrease effort in the final period or they would have decreased wages in anticipation. These results suggest that participants' reciprocal behavior was not merely a consequence of mimicking a reciprocal type for future financial gain.

Figure 2 provides descriptive data that also indicate that effort increases in wage in both stage one and stage two. Panel A of Figure 2 presents a graph of mean initial effort for ten lira wage strata, along with the number of observations for each wage stratum.[10] As shown in Panel A, for the lowest wage stratum of 20–29 lira, mean effort (0.12) is close to the minimum possible level (0.10). Mean effort increases monotonically for each ten lira wage stratum between 30 and 120 lira, and mean effort is highest (0.67) at wages above 99 lira. This pattern is consistent with H1a in that workers provided higher effort when they were paid higher wages.

Panel B of Figure 2 presents a graph of mean stage two effort for ten lira wage strata. Consistent with H1b, the stage two data also show an upward trend for effort as wages increase. However, the relation between wages and effort in stage two appears to be less monotonic. This is likely due to the moderating effect of firm profit, which is discussed in the next section.

Table 2 reports the results of regressions that provide additional support for H1a and H1b. To test H1a, initial effort was regressed on initial wage (Panel A). To control for heteroscedasticity caused by repeated observations within participants, the White estimator (Greene 2000) is used in this regression as well as all other regressions reported in this paper. Consistent with H1a, the wage coefficient is positive (.010) and statistically significant ($p < .001$), indicating that effort increases in wage.[11] Whereas a regression coefficient of 0.010 may appear small, it represents a meaningful effort response given the experimental parameters. That is, this result suggests that a ten lira increase in wage resulted in a 0.1 increase in effort, or 10 percent of the effort range.

To test H1b, stage two effort was regressed on stage two wage (Panel B). Consistent with H1b, the wage coefficient is positive (.011) and statistically significant ($p < .001$), indicating that, as was the case in stage one, effort increases in wage in stage two.[12]

In summary, the regression results described above, along with the statistically significant correlations between wages and effort reported earlier, support H1a and H1b. That is, workers who were paid higher wages reciprocated by choosing higher effort levels even

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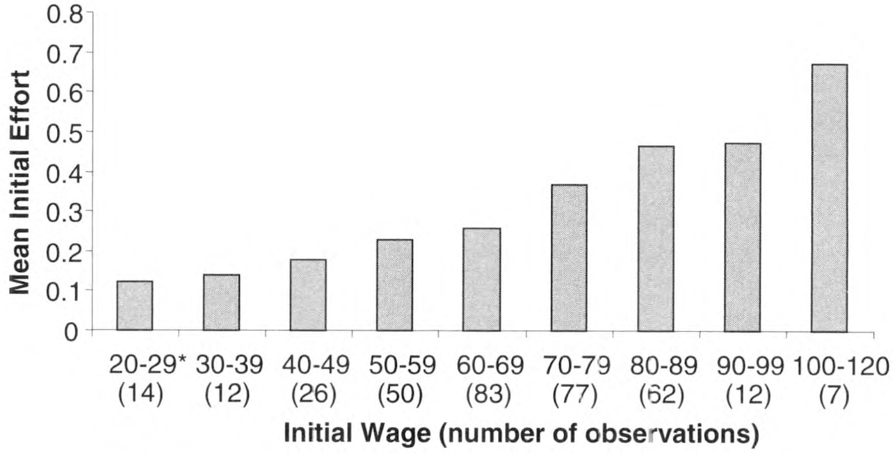
[10] Five wage offers were not accepted by any worker and thus are excluded from all analyses. Two wage offers were rejected in one session (25, 39 lira) and three wage offers were rejected in another session (20, 25, 43 lira). Excluding these five unaccepted wage offers leaves a total n of 343 (29 firms × 12 periods = 348 − 5 unaccepted = 343).

[11] Both models reported in Table 2 estimate a negative intercept, which indicates that, at the minimum wage of 20 lira, participants would have chosen effort below the minimum level if they had been permitted to do so.

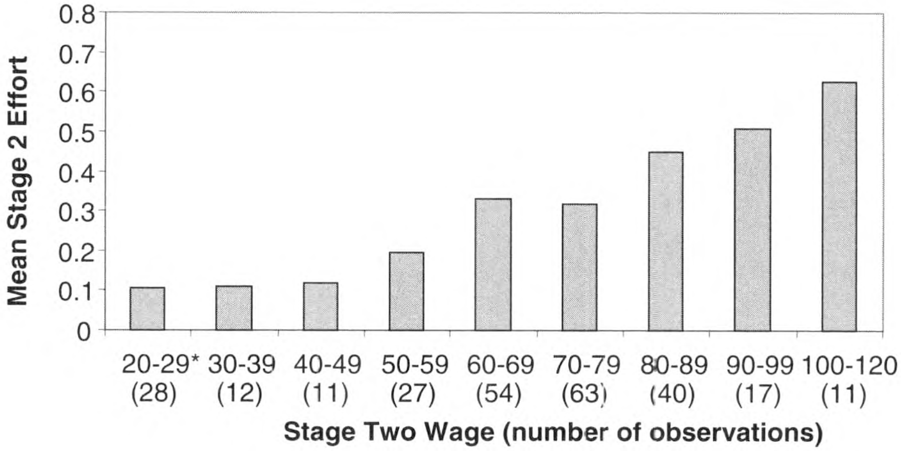
[12] To control for possible period effects, the regressions testing H1a and H1b were re-run with the inclusion of period dummy variables and again with period dummy as well as period × wage interaction variables. Regression results are substantively the same as those reported in Table 2 in that the wage coefficient remains virtually unchanged. In addition, (with the possible exception of period two, which has a positive and marginally significant period × initial wage interaction coefficient), the regressions do not indicate that the wage-effort relation in period 12 differed from any other period for either stage one or stage two data.

FIGURE 2
Mean Effort Conditional on Wage

Panel A: Stage One Data



Panel B: Stage Two Data



* Conventional economic assumptions predict that this bar would represent all observations.

though they could not be rewarded *ex post* for their effort and reputation could not play a role. This suggests that workers were willing to incur the financial cost of higher effort in order to reward firms who treated them kindly by paying higher wages.[13]

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[13] Although the majority of workers behaved reciprocally, five participants (14 percent) behaved selfishly by always choosing minimum effort. There is evidence that reciprocity in the work place is a learned social preference. Participants were split into two groups based on the median years of professional work experience they reported on the post-experimental questionnaire. Worker-participants with above-median professional work experience provided higher mean effort compared to worker-participants with below-median professional work experience ($t_{34} = 2.56$, $p < .02$ two-tailed), although there was no significant difference in wages across the two groups.

TABLE 2
Initial and Stage Two Effort Regressions

Variable	Panel A Initial Effort Regression Coefficient (standard error)
Initial wage	.010[a] (.001)
Intercept	−.118[a] (.040)

Variable	Panel B Stage Two Effort Regression Coefficient (standard error)
Initial wage	.011[a] (.001)
Intercept	−.298[a] (.057)

[a] Significant at $p < .01$ (two-tailed).
Panel A model: Initial effort = $\alpha + \beta$ Initial wage + ε.
Panel B model: Stage two effort = $\alpha + \beta$ Stage two wage + ε.
Two-sided censored (Tobit) regressions are used because the range of the dependent variable is censored at the lower and upper bounds (i.e., at 0.1 and 1.0). The regressions use the White estimator to control for heteroscedasticity resulting from repeated observations within participants. The wage variable is normalized so that the intercept is equal to the minimum permissible wage of 20 lira.

Firm Behavior in Stage One

Support for H1a indicates that workers provided higher effort when they were paid higher wages. Of course, paying higher wages is profitable only if the return from higher effort is greater than the cost of higher wages. Regression results (not tabulated) indicate that firm profit increased in wages, but at a decreasing rate. That is, a regression of stage one firm profit on initial wage and initial wage squared indicates that both wage terms are statistically significant (p's < .01), with a positive coefficient on initial wage (+.432) and a negative coefficient on initial wage squared (−.003). These results suggest that paying ten lira more in wages resulted in about a four lira increase in net profit $((10 \times .432) + (100 \times -.003) = 4.0)$. That is, paying higher wages resulted in higher firm profit even though wages were a cost to the firm. The regression results also suggest that firms would maximize expected profit by paying a wage of 68 lira, which is very close to the mean initial wage of 65.4 lira observed in the experiment. Thus, it appears that, on average, firm participants were fairly adept at selecting a wage that would maximize their profit. Finally, the regression results suggest that, unless workers decreased their effort responses, the high wages observed in the experiment would be sustainable beyond the twelve experimental periods.

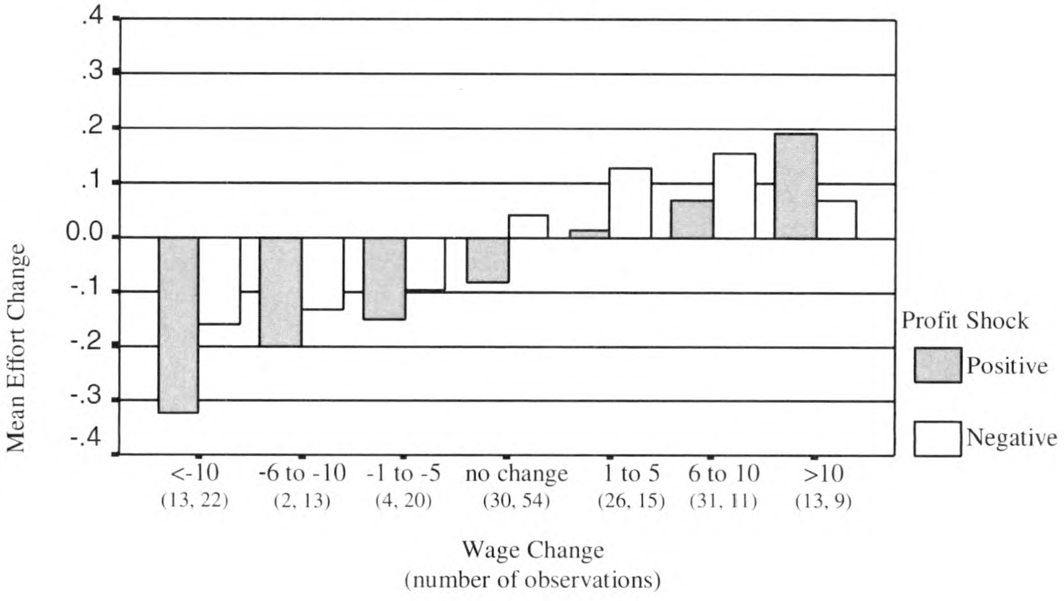
Tests of Hypothesis 2

Hypothesis 2 predicts that, conditional on the wage change between stages one and two, workers' effort change between stages one and two is greater when firm profit decreased than when it increased. This hypothesis is tested by relating wage change (stage two wage minus initial wage) to effort change (stage two effort minus initial effort) across profit shock conditions. Stage two wage and stage two effort observations occurred only when the random draw for the period indicated a nonzero profit shock. Of the 72 total periods in the experiment (6 sessions × 12 periods), there were 17 zero profit shock draws, 25 positive profit shock draws, and 30 negative profit shock draws, resulting in 263 stage two wage and effort observations (119 positive profit shock and 144 negative profit shock). The draws were distributed fairly evenly across experimental sessions, with between four and five positive profit shock draws and between four and six negative profit shock draws observed for each session.[14]

Figure 3 presents descriptive data related to workers' effort response across profit shock conditions, with wage changes grouped into five-lira strata. Several patterns are apparent from Figure 3. First, when firms decreased wages, workers tended to decrease effort, and when firms increased wages, workers tended to increase effort.[15] This suggests that workers punished firms for decreasing their wages and rewarded firms for increasing their wages. Second, with the exception of the highest wage change stratum in the negative profit shock condition, effort change increases monotonically in wage change. This pattern suggests that the magnitude of punishment or reward, in terms of effort change, is directly related to the magnitude of the wage change.

FIGURE 3

Effort Change Conditional on Wage Change and Profit Shock



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[14] Because the data show no significant differences across the two profit shock levels (10 or 20 lira), the data for the two levels were pooled for all analyses.

[15] Of the 74 wage decrease observations, there are 43 (58 percent) effort decrease observations, 30 (41 percent) no effort change observations, and only one (1 percent) effort increase observation. Of the 105 wage increase observations, there are 51 (49 percent) effort increase observations, 47 (45 percent) no effort change observations, and only seven (6 percent) effort decrease observations.

The third pattern is directly related to, and consistent with, the prediction of H2. With the exception of very high wage increases (>10 lira), the mean effort change is always greater (i.e., more positive) for negative profit shocks than for positive profit shocks. That is, when firms increased wages, workers increased effort more when profit decreased than when it increased. When firms did not change wages, workers *decreased* effort when profit increased but *increased* effort when profit decreased. Finally, when firms decreased wages, workers reduced effort, but to a lesser extent when profit decreased than when it increased.

Hypothesis 2 is formally tested by regressing effort change on wage change.[16] Table 3 reports the results of three models. Model 1 is a baseline regression, which shows that effort change increases in wage change ($p < .002$). Model 2 adds a dummy variable for profit shock, coded 1 to indicate negative profit shocks. The coefficient on the profit shock dummy variable is positive (.071) and statistically significant ($p < .028$), indicating that, consistent with H2, effort change is greater for negative profit shocks. Model 3 adds an interaction term. Although the interaction term is not statistically significant ($p = .398$), indicating that the slope of the effort response was unaffected by profit shock condition, the profit shock dummy variable is still positive (.073) and statistically significant ($p < .027$). Thus, both Model 2 and Model 3 support H2 in that, on average, effort change was greater in the negative profit shock condition for all wage changes.[17]

Research Questions 1a and 1b

The research questions investigate whether there is asymmetry in the effort response for wage increases compared to wage decreases for each individual profit shock condition. A single regression, reported in Table 4, is used to investigate both research questions. In order to allow the effort response to vary across the two profit shock conditions as well as the three wage change directions, six variables were regressed on effort change. That is, the regression allows for separate intercepts for each profit shock condition, separate slopes for wage increases for each profit shock condition, and separate slopes for wage decreases for each profit shock condition.[18]

The first three rows in Table 4 report the regression coefficients for the positive profit shock condition. If the magnitude of the effort response to wage increases is the same as the magnitude for wage decreases, the sum of the respective coefficients (+.008 and −.022) would equal 0. It does not ($F_{(1,34)} = 10.77$, $p < .003$). In fact, the relative size of the

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[16] To test whether the wage-effort relation in stage two is an artifact of profit shock draws that distributed initial wages and initial effort levels disproportionately across profit shock conditions, I regressed initial wage on a dummy variable for negative profit shock, again controlling for repeated measures across participants. The coefficient on the profit shock dummy variable is not significant ($p = .408$). A similar regression using initial effort as the dependent variable also resulted in a nonsignificant ($p = .656$) profit shock dummy variable. These two regressions, together with the experimental procedure of randomly determining the profit shock only after initial wage and initial effort had been determined, adds confidence that the stage two results are not an artifact of disproportionate distributions of initial wage and initial effort across profit shock conditions.

[17] Models controlling for period effects (not tabulated) result in almost identical wage change and profit shock coefficients. In addition, the correlation of wage change and effort change is statistically significant ($p < .10$) for 11 of the 12 periods for the positive profit shock condition and for ten of the 11 periods in which negative profit shocks occurred for the negative profit shock condition. The correlation in period 12 is statistically significant ($p < .05$) for each profit shock condition. Thus, the experimental results appear to be robust throughout the 12 periods.

[18] The regression model is shown in Table 4. An OLS regression was used. An OLS, rather than censored, regression is appropriate because there is only one observation at the extreme effort change values of −0.9 or + 0.9. The regression controls for repeated observations within participants via the White adjustment for heteroscedasticity. To control for floor effects in the dependent variable, the independent variable is truncated at 15 for wage decreases. That is, wage decreases greater than 15 in magnitude were re-coded as 15 because, in every case, the stage two effort is at the minimum level of 0.1. The data exhibit no ceiling effects, therefore wage increases are not truncated at 15.

TABLE 3
Effort Change Regressions

Variable	Model 1 Coefficient (standard error)	Model 2 Coefficient (standard error)	Model 3 Coefficient (standard error)
Intercept	$-.022^c$ (.011)	$-.062^a$ (.018)	$-.066^a$ (.018)
Wage Change	$.010^a$ (.001)	$.011^a$ (.002)	$.012^a$ (.002)
d Profit Shock		$.071^b$ (.027)	$.073^a$ (.026)
d Profit Shock × Wage Change			$-.003$ (.003)

[a] Significant at $p < .01$ (two tailed).
[b] Significant at $p < .05$ (two tailed).
[c] Significant at $p < .10$ (two tailed).
Model 1: Effort Change = $\alpha + \beta$ Wage Change + ε;
Model 2: Effort Change = $\alpha + \beta_1$ Wage Change + β_2 d Profit Shock + ε; where d Profit Shock = 1 when profit shock is negative, and 0 otherwise; and
Model 3: Effort Change = $\alpha + \beta_1$ Wage Change + β_2 d Profit Shock + β_3 d Profit Shock × Wage change + ε, where d Profit Shock × Wage Change is an interaction term.
The regressions are estimated using OLS and the White estimator to control for heteroscedasticity resulting from repeated observations within participants.

coefficients suggests that workers decreased effort by almost three times as much in response to wage decreases as they increased effort in response to wage increases. Consequently, this suggests that when firm profit increases, workers respond more strongly to the negative intentions associated with wage decreases than to the positive intentions associated with wage increases.

The last three rows of Table 4 report the regression coefficients for the negative profit shock condition. Notably, and consistent with Figure 3, the coefficient for wage decreases is negative, indicating that workers punished firms for decreasing wages even though profit decreased. Moreover, the magnitude of the coefficient for wage decreases (−.012) is twice that for wage increases (+.006) and this difference in magnitude is statistically significant at marginal levels ($F_{(1,34)} = 3.02$, $p < .10$). These results indicate that workers punished firms more for decreasing wages than they rewarded them for increasing wages, even though the wage decrease was in response to decreased firm profit.[19]

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[19] The regression reported in Table 4 also provides additional insight into the predictions of H2. Consistent with the regression results reported in Table 3, a comparison of the three positive profit shock coefficients to the three negative profit shock coefficients indicates that effort is higher when profit decreased ($F_{(1,34)} = 12.83$, $p < .01$). Comparisons conditional on wage change direction, however, show that this relation only holds for no wage change and wage decreases. Specifically, when wages were not changed, effort was higher for the negative profit shock condition compared to the positive profit shock condition (+.041 versus −.080, $F_{(1,34)} = 12.95$, $p < .01$). Likewise, when wages were decreased, the effort slope is greater for the negative profit shock condition compared to the positive profit shock condition (−.012 versus −.022, $F_{(1,34)} = 4.48$, $p < .05$). However, there is no difference in effort slope across profit shock conditions when wages were increased (+.006 versus +.008, $F_{(1,34)} = 0.52$, $p = .476$). The lack of support for H2 for wage increases is apparently caused by the lack of monotonicity in wage increases for negative profit shocks, as shown in Figure 3.

TABLE 4
Effort Change Regression
Unique Slopes and Intercepts

Variable	Experimental Condition: Profit Shock, Wage Change	Interpretation	Coefficient (standard error)
d_1	Positive, zero	Intercept when profit shock is positive	$-.080^a$ (.025)
$d_2 \times \lvert\text{wage change}\rvert$	Positive, increase	Slope for wage increases when profit shock is positive	$+.008^a$ (.001)
$d_3 \times \lvert\text{wage change}\rvert$	Positive, decrease	Slope for wage decreases when profit shock is positive	$-.022^a$ (.004)
d_4	Negative, zero	Intercept when profit shock is negative	$+.041^b$ (.019)
$d_5 \times \lvert\text{wage change}\rvert$	Negative, increase	Slope for wage increases when profit shock is negative	$+.006^c$ (.003)
$d_6 \times \lvert\text{wage change}\rvert$	Negative, decrease	Slope for wage decreases when profit shock is negative	$-.012^a$ (.002)

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[a] Significant at $p < .01$ (two-tailed).
[b] Significant at $p < .05$ (two-tailed).
[c] Significant at $p < .10$ (two-tailed).
$R^2 = .37$
Regression model:

$$\text{effort change} = \beta_1 d_1 + \beta_2 d_2 \times \lvert\text{wage change}\rvert + \beta_3 d_3 \times \lvert\text{wage change}\rvert + \beta_4 d_4 + \beta_5 d_5 \times \lvert\text{wage change}\rvert + \beta_6 d_6 \times \lvert\text{wage change}\rvert + \varepsilon$$

where:
$d_1 = 1$ if positive profit shock and wage change $= 0$, and 0 otherwise;
$d_2 = 1$ if positive profit shock and wage change > 0, and 0 otherwise;
$d_3 = 1$ if positive profit shock and wage change < 0, and 0 otherwise;
$d_4 = 1$ if negative profit shock and wage change $= 0$, and 0 otherwise;
$d_5 = 1$ if negative profit shock and wage change > 0, and 0 otherwise;
$d_6 = 1$ if negative profit shock and wage change < 0, and 0 otherwise; and
|wage change| refers to the absolute value of the wage change.

The regression is estimated using OLS and the White estimator to control for heteroscedasticity resulting from repeated observations within participants.

Firm Behavior in Stage Two

How adept were firm participants in choosing the best strategy to maximize profits during stage two? This is a more difficult task in stage two than in stage one because, as shown in the regression reported in Table 4, the direction and magnitude of the effort response is affected by both the type of profit shock and the direction of the wage change. To investigate which was the best wage change strategy given the profit shock, stage two firm profit was regressed on stage two wage, plus three dummy variables indicating wage change direction. Panel A of Table 5 reports the regression results for the positive profit shock condition. Expected profit was positive for any wage change strategy, and highest for wage increases (intercept = 50.55) and lowest for wage decreases (intercept = 41.32, difference is significant at $p < .01$). Firm-participants were fairly adept at predicting the most profitable wage-change strategy in response to positive profit shocks because most of the time they chose the most profitable strategy of increasing wages (70/119 = 59 percent), and rarely chose the least profitable strategy of decreasing wages (19/119 = 16 percent).

Table 5, Panel B reports the regression results for the negative profit shock condition. Not surprisingly, expected profits are lower compared to the positive profit shock condition because the profit shock decreased rather than increased other income. As in the positive profit shock condition, the firm's worst strategy was decreasing wages, which resulted in lower expected profit compared to not changing wages (intercept of 11.21 versus 17.40, $p < .01$) as well as compared to increasing wages (intercept of 11.21 versus 15.80, $p < .06$, one-tailed). However, there was no difference in expected profit between increasing wages and not changing them (intercept = 15.80 versus 17.40, $p = .555$). Reflecting this more

TABLE 5
Effect of Firms' Wage Changes on Profit

Panel A: Positive Profit Shock Condition

Variable	Coefficient (standard error)	Test
Stage two wage	−.068	
	(.048)	
d Wage decrease	41.32[a]	Decrease = No Change
	(1.54)	$F_{(1,34)} = 3.95$, $p = .055$
d No change	46.02[a]	No Change = Increase
	(3.53)	$F_{(1,34)} = 4.35$, $p = .045$
d Wage increase	50.55[a]	Increase = Decrease
	(4.00)	$F_{(1,34)} = 12.53$, $p = .001$
$R^2 = .96$		
Panel B: Negative Profit Shock Condition		
Stage two wage	.008	
	(.035)	
d Wage decrease	11.21[a]	Decrease = No Change
	(1.54)	$F_{(1,34)} = 9.99$, $p = .003$
d No change	17.40[a]	No Change = Increase
	(3.29)	$F_{(1,34)} = 0.36$, $p = .555$
d Wage increase	15.80[a]	Increase = Decrease
	(3.78)	$F_{(1,34)} = 2.68$, $p = .111$
$R^2 = .74$		

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[a] Significant at $p < .01$ (two tailed).

[b] Significant at $p < .05$ (two tailed).

Regression model:

Firm Profit = α + Stage 2 Wage + dWage decrease + dNo change + dWage increase + ε

where:

d Wage decrease = 1 if wage was decreased, and 0 otherwise;
d No change = 1 if wage change = 0, and 0 otherwise; and
d Wage increase = 1 if wage was increased, and 0 otherwise.

The regressions are estimated using OLS and the White estimator to control for heteroscedasticity resulting from repeated observations within participants.

difficult decision environment, firm participants were less adept at choosing the most profitable wage change strategy when the profit shock was negative. Although the least profitable strategy was to decrease wages, 38 percent (55/144) of the observations are wage decreases. Apparently it was difficult for many firm participants to predict that workers would be less willing to share profit decreases than profit increases. The remaining observations consist of 38 percent unchanged wages and 24 percent increased wages, either of which resulted in the same expected profit.

V. DISCUSSION

The results of this study demonstrate that reciprocity can play an important role in motivating employees. More importantly, this study extends earlier studies by showing that the degree of reciprocity is influenced by the perceived generosity of wages in relation to firm profit. That is, as in earlier studies, workers who were paid higher wages reciprocated with higher effort even though there was no *ex post* reward for doing so. However, the degree of reciprocity was influenced by firm profit. Specifically, when firms increased wages, workers reciprocated with a greater increase in effort if the wage change followed a decrease (rather than an increase) in firm profit. Likewise, when firms decreased wages, workers reciprocated with a lower decrease in effort if the wage change followed a decrease (rather than an increase) in firm profit. Finally, when firms kept wages constant, workers *decreased* effort if firm profit had increased but *increased* effort if firm profit had decreased. Interestingly, the magnitude of workers' effort responses was much greater for wage decreases compared to wage increases.

These findings have potential implications for accounting research related to earnings management aimed at employee stakeholders. The findings suggest that increased firm profit raises employees' expectations regarding appropriate wage increases, which could either increase labor costs if the firm meets the wage expectations, or decrease labor productivity if the firm does not meet the wage expectations and employees decrease effort in response. Therefore, firms may want to consider these potential costs when making discretionary accounting choices that affect reported profit. This suggestion is consistent with DeAngelo and DeAngelo's (1991) finding that firms made income-decreasing accounting choices when negotiating wage concessions.

The findings of this study also have implications for contracting research. My study highlights the important role that reciprocity can play in motivating employees. As such, it adds to the growing evidence of the usefulness of socially mediated rewards in motivating and controlling employees (Sprinkle 2003). If behavioral factors such as reciprocity motivate employees, then the typical agency approach to contract design, which assumes a trivial impact of any utility derived from nonpecuniary factors, may result in contracts that are inefficient compared to alternatives that incorporate a broader set of behavioral factors. Participants in my study responded to wages and firm profit in systematic ways predicted by behavioral theories. This finding provides potential insights for the integration of behavioral and economic factors in the design of efficient contracts.

Reciprocity studies to date have implicitly assumed that there are selfish or reciprocal types. As such, these studies have focused on which institutional mechanisms encourage either selfishness or reciprocity to emerge as the dominate behavior in experimental labor markets (see Fehr and Gachter [2000] for a discussion). My study's finding that firm profit affects the degree of reciprocity suggests that individuals may not be static types but rather may make evaluative judgments concerning the appropriate degree of reciprocity. Future research could investigate whether factors, other than firm profit, also affect the degree of reciprocity.

Future research could also investigate whether the degree of reciprocity is affected by attributions related to profit changes. In my experiment, the random determination of other income ensured that workers attributed the responsibility for profit changes to external factors. In the field, however, employees may attribute the responsibility for profit changes to their own actions, to the actions of other employees, and/or to environmental factors. The degree of reciprocity may be affected by these attributions.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 189–219

The Effect of Conference Calls on Analyst and Market Underreaction to Earnings Announcements

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ABSTRACT: I extend prior research on the information content of conference calls by examining whether they accelerate analysts' and investors' responses to the future implications of currently announced earnings. I find that the initiation of conference calls is associated with a significant reduction in the serial correlation in analyst forecast errors, a measure of initial analyst underreaction. I also find that the initiation of conference calls is associated with significant reductions in two measures of initial investor underreaction: (1) post-earnings announcement drift and (2) the *proportion* of the total market reaction to firms' earnings announcements that is "delayed" (i.e., that is attributable to post-earnings announcement drift). The reduction in post-earnings announcement drift surrounding conference call initiation is concentrated in the set of sample firms where drift is most severe (i.e., the smallest, least heavily traded sample firms) while the largest, most heavily traded sample firms do not exhibit significant drift either before or after conference call initiation. Robustness tests, including analyses of matched samples of nonconference call firms, indicate that the results are not driven by general increases in analyst and investor sophistication over time or by contemporaneous increases in the information and trading environments of conference call initiators.

Keywords: *conference call; post-earnings announcement drift; voluntary disclosure.*

Data Availability: *The data used in this study are available from the sources listed in the text.*

I thank members of my dissertation committee: Steve Baginski—Chair, Bob Jennings, Jerry Salamon, and Jim Wahlen for their guidance. I appreciate the helpful comments of two anonymous reviewers. I also thank Andrea Astill, Dave Barrett, Daniel Beneish, Walt Blacconiere, and workshop participants at Boston College, Emory University, The George Washington University, Harvard Business School, Indiana University, University of Michigan, University of Pennsylvania, and Washington University for helpful discussions and comments. I appreciate the programming assistance of Arnie Cowan. I am grateful for the financial support of the KPMG Peat Marwick Foundation. I thank Stan Levine and FirstCall/Thomson Financial for the conference call data used in this study. I also gratefully acknowledge the contribution of I/B/E/S International Inc. for providing earnings per share forecast data. These data have been provided as part of a broad academic program to encourage earnings expectations research.

Editor's note: This paper was accepted by Lawrence Brown, Editor.

Submitted November 2002
Accepted March 2004

I. INTRODUCTION

I extend prior research on the information content of conference calls by examining whether they accelerate analysts' and investors' reaction to the future implications of currently announced earnings. The effect of conference calls on analyst and market earnings expectations is an important question because companies have increasingly used conference calls in recent years to enhance investors' understanding of earnings announcements. Prior studies establish that conference calls are informative to market participants in that they trigger heightened trading and stock price responses (Frankel et al. 1999; Bushee et al. 2003; Kohlbeck and Magilke 2004) and help analysts form more accurate earnings expectations (Bowen et al. 2002). Despite this evidence, it is unclear whether conference calls improve the efficiency of analyst and investor reactions to the future implications of currently announced earnings.

I find that the initiation of conference calls is associated with a significant reduction in the serial correlation in analyst forecast errors, a measure of initial analyst underreaction. I also find that the initiation of conference calls is associated with significant reductions in two measures of initial investor underreaction: (1) post-earnings announcement drift and (2) the *proportion* of the total market reaction to firms' earnings announcements that is "delayed" (i.e., attributable to post-earnings announcement drift). I show that the reduction in post-earnings announcement drift surrounding conference call initiation is concentrated in the set of sample firms where drift is most severe (i.e., the smallest, least heavily traded ones) while the largest, most heavily traded sample firms do not exhibit significant drift either before or after conference call initiation. Robustness tests, including analyses of matched samples of nonconference call firms, indicate that the results are not driven by general increases in analyst and investor sophistication over time or by contemporaneous increases in the information and trading environments of conference call initiators. Overall, my findings are consistent with conference calls resulting in more timely analyst and investor responses to the future implications of current earnings surprises.

Supplemental tests provide mixed evidence on whether, in addition to accelerating analyst and investor reactions to the future implications of current earnings surprises, conference calls increase the total amount of information about the persistence of currently announced earnings that market participants use in the period leading up to the subsequent earnings announcement. I find that the conference-call-related decline in the serial correlation in analyst forecast errors persists when the post-earnings announcement forecast is measured just prior to the subsequent earnings announcement. Since the prevailing forecast just prior to the subsequent earnings announcement incorporates all other information that analysts use during the quarter, conference calls apparently add to the total amount of information released during the quarter about the persistence of previously announced earnings. My evidence is consistent with Bowen et al.'s (2002) contention that conference calls add to the total amount of information that analysts use about forthcoming earnings. By contrast, I find no evidence that conference calls are associated with a decline in post-earnings announcement drift when the return interval is limited to the three-day period ending with the subsequent earnings announcement. Because returns over this shorter return interval are accumulated after investors react to the arrival of all other information during the quarter, my failure to find a reduction in drift for this shorter interval indicates that conference calls do not increase the total amount of information about the persistence of previously announced earnings that investors assimilate during the quarter.

The remainder of my study proceeds as follows. Section II discusses related literature on conference calls and develops hypotheses. Section III describes the sample. Section IV discusses research design and empirical results. Section V provides concluding remarks.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Conference Calls as a Disclosure Medium

Conference calls are an increasingly important voluntary disclosure mechanism for U.S. companies, providing corporate managers with the opportunity to comment on the most recent quarterly results and to highlight their implications for future financial performance. Earnings-related conference calls are held generally within a few hours to a day following the issuance of the earnings announcement press release. A typical conference call includes opening remarks by management (which generally reiterate the important items in the press release) followed by a question-and-answer session with invited analysts, during which time details not contained in the press release are often disclosed.

Several studies have investigated the information content of conference calls. Bowen et al. (2002) address the question of whether conference calls are incrementally informative about future earnings by examining the effect of conference calls on analyst forecasts. They find that the improvement in analyst forecast accuracy surrounding earnings announcements is greater when earnings announcements are accompanied by conference calls. They also find that the accuracy improvement is sustained until the next quarterly earnings announcement, suggesting that conference calls are not merely substitutes for other unobservable disclosures.[1]

Consistent with conference calls providing material information to investors, Frankel et al. (1999) and Bushee et al. (2003) document heightened levels of trading activity and return volatility during conference calls while Kohlbeck and Magilke (2004) document greater abnormal returns (in absolute value) during earnings announcement periods accompanied by conference calls. It is possible, however, that conference calls induce heightened levels of trading and return volatility without improving capital market reactions to earnings announcements (i.e., they may induce excessive volatility as a result of suboptimal investor reaction to the information conveyed).[2] Examining the effect of conference calls on drift provides more direct insight on whether conference calls improve the efficiency of the capital market reaction to earnings announcements.

The Potential Effect of Conference Calls on Analyst and Market Underreaction to Current Earnings Surprises

Earnings for the upcoming quarter can be decomposed into two components: the persistent portion of past earnings and innovations having their first financial statement impact on the next quarter's earnings. Prior findings of both a significant positive correlation between currently announced earnings surprises and subsequent stock returns (e.g., Ball and Brown 1968; Foster et al. 1984; Bernard and Thomas 1990; Bartov et al. 2000) and a positive serial correlation in analyst forecast errors (e.g., Mendenhall 1991; Abarbanell and Bernard 1992; Shane and Brous 2001; Mikhail et al. 2003) suggest that investors and analysts ignore some of the persistent portion of previously announced earnings when forming expectations of future earnings.

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[1] As discussed in the next section, however, it is possible for conference calls to improve expectations of future earnings but that underreaction to current earning surprises still occurs.

[2] Lee (1992) documents that small investors' buying behavior during earnings announcement periods is not related to the nature of the earnings news, suggesting that individual investor trading behavior is not always information-based. Hence, evidence of abnormal trading activity may not reflect the true information content of a conference call. In a similar vein, Bushee et al. (2003) raise the possibility that heightened trading activity and stock return volatility during conference calls may be caused partly by individual investors overreacting to the information conveyed during these calls.

To the extent that drift is due to the market's inefficient processing of earnings information, Soffer and Lys (1999) argue that the release of information that makes the future implications of current earnings surprises more transparent should mitigate investor underreaction, thereby reducing post-earnings announcement drift. This reasoning can be extended to analysts, suggesting that the serial correlation in analyst forecast errors should decline with the arrival of additional information about the persistence of previously announced earnings. Because managers hold conference calls in close proximity to earnings announcements and use them to expound on the current earnings release, conference calls are ideally suited to mitigate underreaction to the current earnings surprise.

It is possible, however, that conference calls improve expectations of future earnings (as demonstrated by Bowen et al. [2002] in the context of analyst forecasts), but that underreaction to current earnings surprises still occurs. This would be the case if conference calls primarily provide information about future earnings that is uncorrelated with the current earnings surprise. For example, a company may disclose plans for a new product rollout during quarter $t+1$ that will have its first financial statement impact on quarter $t+1$'s earnings. Such information should improve analyst expectations of quarter $t+1$'s earnings (as demonstrated by Bowen et al. 2002) and heighten capital market responses (as demonstrated by Frankel et al. 1999; Bushee et al. 2003; Kohlbeck and Magilke 2004), but it would not reduce analyst or investor underreaction because it does not provide information on the portion of quarter t's earnings surprise expected to recur in quarter $t+1$. Therefore, I focus not on whether conference calls improve future earnings expectations (the question that Bowen et al. [2002] addresses), but on whether they improve the efficiency (i.e., the timeliness) with which market participants use current earnings information in forming future earnings expectations.

In order to test whether conference calls accelerate the arrival of information about the persistent portion of the current earnings surprise, I examine if conference calls mitigate initial analyst and investor underreaction by relating conference call use to the serial correlation in analyst forecast errors and to post-earnings announcement drift. I propose two hypotheses, stated in alternative form.

> **H1:** The serial correlation in analyst forecast errors declines for firms that begin regularly using conference calls in connection with their quarterly earnings announcements.
>
> **H2:** The magnitude of post-earnings announcement drift declines for firms that begin regularly using conference calls in connection with their quarterly earnings announcements.

III. SAMPLE

Treatment Firms

The starting point for my sample used to test the effect of conference calls on the serial correlation in analyst forecast errors is the set of all firm-quarter combinations on I/B/E/S for the period spanning from the first quarter of 1994 through the second quarter of 2000 with at least one analyst meeting two criteria: (1) the analyst's most recent forecast of quarter t's earnings as of ten days prior to quarter t's earnings announcement was less than 90 days old, and (2) the analyst revised his or her forecast of quarter $t+1$'s earnings in the 30 days subsequent to quarter *t*'s earnings announcement.[3] If a conference call was held in conjunction with quarter *t*'s earnings announcement, the analyst's earnings forecast revision had to have been made subsequent to both the earnings announcement and the conference call so that it reflects the analyst's exposure to both the earnings announcement and the related conference call. I further require observations to have the earnings per share and price data on I/B/E/S needed to calculate price-scaled forecast errors for both quarter *t* and quarter *t*+1 earnings.

The starting point for the sample used in testing the effect of conference calls on drift consists of all firm-quarters from the Compustat merged tapes for the period, first quarter of 1994 through the second quarter of 2000.[4] After identifying those observations with the necessary data on Compustat and CRSP to calculate standardized unexpected earnings and cumulative abnormal returns, I exclude observations with extreme returns (defined as those in the top or bottom 0.50 percent on any of the return metrics).

For both samples, I impose two restrictions to isolate firms that began conducting conference calls during the sample period and to reduce the influence of confounding factors:

1) Each firm must have been first listed on the FirstCall conference call database during or after the first quarter of 1996.
2) Nonconference call quarters after the first conference call are eliminated from the sample.

FirstCall began tracking conference calls in the second quarter of 1995. Therefore, firms listed on the database from its inception may have first engaged in conference calls prior to 1995. The first requirement is designed to include only firms whose first appearance on the FirstCall database is likely to be the firm's first conference call. Because conference calls may convey information that improves earnings expectations beyond the next quarter, I exclude nonconference call quarters after firms initiate conference calls to increase power for distinguishing between conference call and nonconference call quarters (consistent with the sample selection criteria in Bowen et al. [2002]).

For the sample used to test the serial correlation in analyst forecast errors, I require each firm to have at least seven quarters of complete data prior to the first conference call followed by at least seven quarters in which a conference call was held. This criterion ensures that each firm has a sufficient time-series both before and after the initiation of conference calls in order to detect any differences in analyst underreaction in firm-specific tests. For portfolio tests of drift, I focus on the narrow window consisting of the four quarters prior to the initial conference call quarter and the four quarters commencing with the first conference call quarter. I require each firm to have at least three quarters of complete data in the four quarters immediately prior to the first conference call and three quarters of complete data in the four quarters commencing with the first conference call. This research design choice is made based on an initial examination of the data, which reveals that firms initiating conference calls experience simultaneous increases over time in a number of variables that have been shown to be negatively related to drift including market capitalization, trading volume, price, and institutional ownership (Foster et al. 1984; Bhushan 1994; Bartov et al. 2000). The contemporaneous increases in these variables present a challenge in attributing any observed reductions in drift to the initiation of conference calls. Narrowing the event window in an event study allows the researcher to more plausibly attribute any observed reactions to the event of interest rather than to other contaminating events. Accordingly, I focus on the year before and the year of conference call initiation in order to increase the likelihood that any declines in drift surrounding the initiation of conference calls is attributable to the conference call initiation decision rather than to changes in other factors associated with drift.

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[3] Mendenhall (1991) and Abarbanell and Bernard (1992) warn that use of consensus forecasts in tests of the serial correlation of analyst forecast errors may overstate the true serial correlation due to the presence of stale forecasts (i.e., forecasts that were not appropriately updated in response to the earnings announcement). I seek to avoid the problem of stale forecasts by only including analysts who revise their quarter *t*+1 forecasts in the 30 days subsequent to quarter *t*'s earnings announcement.

[4] Because 1999 and 2000 were characterized by an unusual run-up in stock prices (particularly on NASDAQ), I perform sensitivity analyses excluding firm-quarters after the fourth quarter of 1998. My results are similar using this reduced sample.

These procedures result in a sample of 141 firms and 2,851 firm-quarters for testing the serial correlation in analyst forecast errors and 518 firms and 3,678 firm-quarters for testing post-earnings announcement drift. Panels A and C of Table 1 summarize the sample selection procedures and Panels B and D provide the related descriptive statistics for these samples.

Control Firms

Mikhail et al. (2003) find that the serial correlation in analyst forecast errors declines as analysts gain experience. Hence, any reductions in the serial correlation in analyst forecasts surrounding the initiation of conference calls that I document for my sample of firms may be attributable to increases in experience due to the passage of time. Thus, before concluding that any reductions in the serial correlation in analyst forecast errors that accompanies the initiation of conference calls is due to the incremental information these calls provide about the persistence of current earnings surprises, it is important to distinguish any conference call-related reductions that I document for my sample of firms from a general decline over time.

Similarly, Johnson and Schwartz (2001) show that the profitability of the post-earnings announcement drift trading strategy has declined as the market has become more astute about this anomaly. Hence, any reductions in post-earnings-announcement drift surrounding the initiation of conference calls may be attributable to a general decline in drift over time. Another explanation for any observed decline in drift is that a firm's decision to engage in conference calls either coincides with or results in enhancements in its information environment and/or declines in trading costs that collectively result in a greater volume of informed trading and, hence, lower drift.[5] Specifically, it is possible that a firm experiences increased analyst and institutional investor interest independent of the conference call decision. If so, this increased capital market attention may be what contributes to a decline in drift and any negative relation between conference call initiation and drift may be simply a result of the fact that a firm's initiation decision coincides with this increased analyst and investor interest.[6] Thus, before concluding that any reductions in drift that accompany the

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[5] Prior research by Bhushan (1994) finds that post-earnings announcement drift can occur even if some investors correctly perceive the earnings process, but transactions costs inhibit their active trading. Diamond (1985) argues that a credible commitment to forthcoming disclosure can reduce trading costs. Healy et al. (1999) provide empirical evidence that enhanced disclosure (as measured by analyst disclosure ratings) is associated with increased analyst and institutional investor interest and stock liquidity. Hence, it is possible for conference calls to be associated with lower drift over time without providing additional information about the persistence of currently announced earnings if conference calls provide other information that contributes positively to the information environment and lowers transactions costs.

[6] Conference calls limit the need for time-consuming one-on-one interactions so firms are more likely to see justifiable benefits to conference calls as analyst and investor interest increases.

TABLE 1
Sample Selection Procedures and Descriptive Statistics

Panel A: Sample Selection Procedures—Sample for Testing the Serial Correlation in Analyst Forecast Errors

	Firms	Firm-Quarters
Firm-quarters available on I/B/E/S from the first quarter of 1994 through the second quarter of 2000 where there is at least one analyst whose most recent forecast of quarter t's earnings as of ten days prior to quarter t's earnings announcement was less than 90 days old and whose prevailing forecast of quarter $t+1$'s earnings as of 30 days subsequent to quarter t's earnings announcement was revised sometime after quarter t's earnings announcement and, if applicable, the conference call associated with quarter t's earnings announcement.	5,770	50,940
Missing actuals data on I/B/E/S or price data on Compustat	(72)	(776)
Firms with no conference calls during the sample period	(2,276)	(12,611)
Firms whose first appearance on the FirstCall database is before 1996	(849)	(15,400)
Nonconference call quarters after the first conference call	(79)	(4,527)
Firms with less than seven conference call quarters and/or less than seven nonconference call quarters	(2,353)	(14,775)
Sample for tests of H1	141	2,851

Panel B: Descriptive Statistics—Sample for Testing the Serial Correlation in Analyst Forecast Errors

Continuous Variables	Observations	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
Treatment Firms						
$FERR2_{i,t+1}$	2,851	−0.0004	0.007	−0.0010	0.0017	0.0012
$FERR1_{i,t}$	2,851	0.0003	0.006	−0.0003	0.0003	0.0013
Control Firms						
$FERR2_{i,t+1}$	2,048	−0.0007	0.011	−0.0013	0.0001	0.0013
$FERR1_{i,t}$	2,048	−0.0001	0.012	−0.0005	0.0003	0.0014

Classification Variable	Treatment Firms		Control Firms	
Conference call periods ($CC = 1$) [%]	1,384	[48.5]	1,043	[50.9]
Nonconference call periods ($CC = 0$) [%]	1,467	[51.5]	1,005	[49.1]
Total [%]	2,851	[100.0]	2,048	[100.0]

Panel C: Sample Selection Procedures—Sample for Testing Post-Earnings Announcement Drift

	Firms	Firm-Quarters
Firm-quarters available on Compustat from the first quarter of 1994 through the second quarter of 2000	17,243	345,375
Missing Compustat data required to calculate standardized unexpected earnings for quarter t	(4,125)	(138,414)
Missing announcement dates on Compustat or CRSP data required to calculate abnormal returns during the announcement period (i.e., *CARANN*) as well as over the two post-announcement periods (i.e., *BHAR* and *CAR12*)	(3,690)	(88,435)

(*continued on next page*)

TABLE 1 (continued)

Panel C: Sample Selection Procedures—Sample for Testing Post-Earnings Announcement Drift (continued)

	Firms	Firm-Quarters
Trimming of extreme returns (i.e., the extreme .50% of *CARANN*, *BHAR*, and *CAR12*)	(47)	(3,414)
Firms with no conference calls during the sample period	(4,681)	(44,243)
Firms whose first appearance on the FirstCall database is before 1996	(1,063)	(22,192)
Nonconference call quarters after the first conference call	(145)	(34,496)
Firms with less than three quarters of complete data in the four quarters immediately prior to the first conference call and/or less than three quarters of complete data in the four quarters commencing with the first conference call	(2,950)	(10,348)
Firms with insufficient data to calculate *DRIFTFACTORS*	(24)	(155)
Sample for test of H2	518	3,678

Panel D: Descriptive Statistics—Sample for Testing Post-Earnings Announcement Drift

Continuous Variables	Observations	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
Treatment Firms						
$BHAR_{i,t}$ (%)	3,678	0.924	23.990	−11.929	−0.414	11.132
$CAR12_{i,t}$ (%)	3,678	2.126	13.557	−4.948	1.320	8.527
$CARANN_{i,t}$ (%)	3,678	0.766	7.375	−2.845	0.369	4.027
$SUE_{i,t}$	3,678	0.001	0.062	−0.002	0.002	0.007
Control Firms						
$BHAR_{i,t}$ (%)	3,612	−2.006	22.355	−13.412	−2.114	8.095
$CAR12_{i,t}$ (%)	3,612	0.925	12.967	−5.699	0.306	7.300
$CARANN_{i,t}$ (%)	3,612	0.173	6.640	−2.834	−0.067	3.143
$SUE_{i,t}$	3,612	−0.002	0.047	−0.004	0.002	0.005

Classification Variable	Treatment Firms		Control Firms	
Conference call periods (*CC* = 1) [%]	1,737	[47.2]	1,842	[51.0]
Nonconference call periods (*CC* = 0) [%]	1,941	[52.8]	1,770	[49.0]
Total	3,678	[100.0]	3,612	[100.0]

Variable Definitions:

$FERR2_{i,t+1} = \frac{(ACT_{i,t+1} - EST_{i,t+1})}{PRICE_{i,t}}$;

$FERR1_{i,t} = \frac{(ACT_{i,t} - EST_{i,t})}{PRICE_{i,t}}$;

$PRICE_{i,t}$ = firm *i*'s stock price at the end of quarter *t*;

$ACT_{i,t}(ACT_{i,t+1})$ = actual earnings per share of firm *i* for quarter *t* (quarter *t*+1) per I/B/E/S;

$EST_{i,t}$ = the average of the most recent forecast of firm *i*'s earnings for quarter *t* made by all analysts whose most recent forecast of quarter *t*'s earnings as of 10 days prior to quarter *t*'s earnings announcement was less than 90 days old and who subsequently revised their forecast of firm *i*'s earnings for quarter *t*+1 sometime during the 30 days subsequent to quarter *t*'s earnings announcement. If firm *i* is a treatment firm that held a conference call related to quarter *t*'s earnings announcement (i.e., $CC_{i,t} = 1$), the revised forecast must have been made after both the earnings announcement and the related conference call;

(*continued on next page*)

TABLE 1 (continued)

$EST_{i,t+1}$ = the average of the prevailing forecast of firm *i*'s earnings for quarter $t+1$ as of 30 days subsequent to quarter *t*'s earnings announcement made by all analysts whose most recent forecast of quarter *t*'s earnings as of ten days prior to quarter *t*'s earnings announcement was less than 90 days old and who subsequently revised their forecast of firm *i*'s earnings for quarter $t+1$ sometime during the 30 days subsequent to quarter *t*'s earnings announcement. If firm *i* is a treatment firm that held a conference call related to quarter *t*'s earnings announcement (i.e., $CC_{i,t} = 1$), the revised forecast must have been made after both the earnings announcement and the related conference call;

$CC_{i,t}$ = 1 if firm *i* is a treatment firm that conducted a conference call during the three-day period spanning one day before to one day after the announcement of quarter *t*'s earnings according to FirstCall's conference call database, and 0 otherwise. If firm *i* is a control firm then $CC_{i,t} = 1$ if quarter *t* is on or after the corresponding treatment firm's initial conference call quarter;

$PRICE_t$ = firm *i*'s stock price at the end of quarter *t*;

$BHAR_{i,t+1}$ = the compounded abnormal return for firm *i* for the period beginning on the second day after quarter *t*'s earnings announcement and ending on the earnings announcement date for quarter $t+1$. It is calculated as the compounded raw return over the return accumulation period less the compounded equally weighted average return over the same return accumulation period for all firms in the same CRSP size decile on the same CRSP exchange index (i.e., NYSE/AMEX or NASDAQ) to which firm *i* belongs;

$CAR12_{i,t+1}$ = $CAR3_{i,t+1} - CAR3_{i,t+2} + CAR3_{i,t+3} - CAR3_{i,t+4}$ where $CAR3_{i,t}$ is the cumulative abnormal return for the three days ending on quarter *t*'s earnings announcement. It is calculated as the compounded raw return over the return accumulation period less the compounded equally weighted average return over the same return accumulation period for all firms in the same CRSP size decile on the same CRSP exchange index (i.e., NYSE/AMEX or NASDAQ) to which firm *i* belongs;

$CARANN_{i,t}$ = the compounded abnormal return for firm *i* for the three days spanning from the day before to the day after the announcement of quarter *t*'s earnings. It is calculated as the compounded raw return over the return accumulation period less the compounded equally weighted average return over the same return accumulation period for all firms in the same CRSP size decile on the same CRSP exchange index (i.e., NYSE/AMEX or NASDAQ) to which firm *i* belongs; and

$SUE_{i,t}$ = $[(EARN_{i,t} - EARN_{i,t-4})]/CAP_{i,t}$, where $EARN_{i,t}$ = earnings (before extraordinary items and discontinued operations) for firm *i* in quarter *t*, and $CAP_{i,t}$ = the market capitalization for firm *i* at the end of quarter *t*.

initiation of conference calls is due to the incremental information these calls provide about the persistence of current earnings surprises, it is important to distinguish any conference call-related drift reductions from a general decline in drift over time and from contemporaneous changes in the information environment and trading costs that may reduce drift.

Accordingly, I examine changes in both the serial correlation in analyst forecast errors and post-earnings announcement drift during the sample period for matched samples of firms that never engaged in conference calls. For each treatment firm, I first identify a set of potential matches as the set of firms with the same two-digit SIC code that never engaged in conference calls. For the sample designated for firm-specific tests of the serial correlation in analyst forecast errors, I require the potential matching firms to have at least seven quarters of complete data both prior to and subsequent to the treatment firm's first conference call to ensure an adequate time-series. For the sample designated for use in portfolio tests of drift I require the potential matching firms to have at least three quarters of complete data in the four quarters prior to the treatment firm's first conference call and three quarters of complete data in the four quarters commencing with the treatment firm's first conference call. Thus, the pre- and post-conference call quarters for each treatment firm and the potential match firms are aligned in calendar time.

For each treatment firm, the ideal control firm is one with exactly the same information environment as the treatment firm in both pre- and post-conference call quarters so that differential changes in analyst and investor reactions to earnings announcements could be most directly attributed to the conference call initiation decision as opposed to other contemporaneous changes in the information environment. Matching only on initial market capitalization (as a measure of the beginning information environment) is imperfect because it leaves open the possibility that the information environments of the treatment and control firms take different paths in post-conference call periods, thus impeding the ability to attribute differential changes in analyst and market reactions solely to the use of conference calls. Matching only on the dollar or percentage change in market capitalization (as a measure of the change in the information environment) is also imperfect because this procedure ignores the fact that the significance of the same dollar or percentage change in market value likely varies depending on the beginning level of market capitalization. In order to identify the set of control firms that are, *on balance*, most similar to the corresponding treatment firms in both pre- and post-conference call periods, I calculate a Euclidean distance measure between each treatment firm and its potential control firms based on two matching criteria: (1) average market capitalization in pre-conference call quarters and (2) average market capitalization in post-conference call quarters. The distance measure is calculated as:

$$\sqrt{\begin{array}{l}(AVEMKTCAPPRE_{treat} - AVEMKTCAPPRE_{control})^2 + (AVEMKTCAPPOST_{treat} \\ - AVEMKTCAPPOST_{control})^2\end{array}}$$

where:

AVEMKTCAPPRE = average market capitalization in quarters prior to the first conference call, and
AVEMKTCAPPOST = average market capitalization in quarters commencing with the first conference call.

For each treatment firm, I select from the set of potential matches the firm with the smallest distance measure to be the corresponding control firm. This matching algorithm identifies the control firm where the aggregate difference in information environments between the control firm and treatment firm in both pre- and post-conference call periods is minimized. The matching procedures resulted in the identification of matches for 104 firms (a total of 2,048 firm-quarter observations) used to test the serial correlation in analyst forecast errors and 509 firms (a total of 3,612 firm-quarter observations) used to test post-earnings announcement drift. Descriptive statistics on these control samples are presented in Panel B and Panel D, respectively, of Table 1.

Panel B of Table 1 reveals that the interquartile ranges of the forecast error metrics are very similar for the treatment and control firms used to test analyst underreaction. However, the standard deviations of the forecast error metrics are nearly twice as large for the control firms, suggesting the potential presence of extreme observations. To address this concern, the subsequently reported regression results exclude observations identified as extreme (i.e., those with a Cook's D greater than 1 or a studentized residual with an absolute value greater than 2).[7] Panel D of Table 1 reveals that the return metrics of the treatment and control firms used to test post-earnings announcement drift are substantially different. Specifically, although the standard deviation of returns is similar between the treatment and control firms, the mean and median returns at all intervals are substantially smaller for the control firms. In the drift tests that follow, I control for differences between the treatment and control firms in the magnitude of returns by incorporating separate intercept and slope shifts for treatment and control firms in regressions that pool treatment and control firm observations.

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[7] In untabulated analyses, I find that the interquartile ranges remain essentially unchanged for both the treatment and control firms and that the standard deviations of the forecast error metrics for the control firms decline to levels very similar to the treatment firms after removing such observations. Hence, the procedures used to remove extreme observations appear to be successful. As indicated in footnote 11, the regression results are insensitive to inclusion of these observations.

To determine whether the initiation of conference calls coincides with changes in other variables that are associated with the magnitude of drift, I examine the behavior of various transactions cost and information environment-related variables surrounding the treatment firms' conference call initiation decision for both the treatment and control firms used in tests of post-earnings announcement drift. First, I examine changes in market capitalization based on Foster et al.'s (1984) finding of an inverse relation between firm size and the magnitude of drift. Second, I examine changes in institutional ownership based on Bartov et al.'s (2000) finding that drift is negatively associated with institutional ownership. Third, I examine changes in analyst following to provide further insight on changes in the information environment that might accompany the initiation of conference calls. Finally, I examine changes in stock price and dollar trading volume, both of which Bhushan (1994) uses as proxies for transactions costs.

Panel A of Table 2 summarizes pair-wise differences between the treatment and control match firms in both the pre- and post-conference call periods. Despite the matching procedures, the treatment and control firms do differ on a number of dimensions that have been noted in the prior literature (Tasker 1998a; Frankel et al. 1999). In both pre- and post-conference call periods, the treatment firms appear to have more robust information and trading environments than their corresponding matches as evidenced by their substantially higher market values, institutional ownership, analyst following and trading volume (all p-values less than 0.01, two-tailed).[8]

Panel B of Table 2 examines differences in the changes that treatment and control firms undergo surrounding the treatment firms' initiation of conference calls. The treatment firms experienced a $211 million greater increase in market capitalization, a 3.7 percent greater increase in institutional ownership, and a $297 million greater increase in trading volume than the corresponding match firm. These results are consistent with Healy et al.'s (1999) finding that sustained increases in disclosure are associated with increased institutional investor and analyst interest as well as higher liquidity. In subsequent tests of the effect of conference calls on post-earnings announcement drift, I include explicit controls for the levels of and changes in factors associated with drift that are not completely controlled through the matching procedures.

IV. RESEARCH DESIGN AND EMPIRICAL RESULTS

Intertemporal Test of the Association between Conference Call Use and the Serial Correlation in Analyst Forecast Errors

I examine the effect of conference calls on the serial correlation in analyst forecast errors by estimating the following regression separately for each of the 141 firms in the sample designated for testing analyst underreaction.

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[8] In untabulated analyses, I find no significant differences between pre- or post-conference call quarters in either the proportion of profit quarters or in the proportion of quarters with positive seasonally differenced earnings. Thus, it does not appear that the conference call initiation decision is associated with changes in the patterns of the signs of earnings levels or earnings changes.

TABLE 2
Comparisons of Treatment and Control Firms

Panel A: Comparison of Treatment and Control Firms Used in Tests of Post-Earnings Announcement Drift Prior to and Subsequent to Treatment Firm's Initiation of Conference Calls

Variables	n	Treatment Firm Mean [Median]	n	Control Firm Mean [Median]	n	Mean [Median] Pair-wise Difference^{a}
Average in the Four Quarters Prior to Treatment Firm's Initiation of Conference Calls						
$IH_{i,t}$	393	0.398 [0.386]	347	0.349 [0.325]	262	0.070$^{\#\#\#}$ [0.079]$^{\#\#\#}$
$MV_{i,t}{}^{b}$	509	1,687,310 [325,922]	509	816,130 [211,141]	509	871,180$^{\#\#\#}$ [16,566]$^{\#\#\#}$
$PRC_{i,t}$	509	22.94 [19.63]	509	22.81 [17.78]	509	0.13 [1.18]$^{\#\#\#}$
$VOL_{i,t}{}^{c}$	509	1,169 [236]	509	575 [131]	509	594$^{\#\#\#}$ [66]$^{\#\#\#}$
$NUMAN_{i,t}$	296	4.36 [3.00]	244	3.41 [2.50]	143	1.40$^{\#\#\#}$ [1.00]$^{\#\#\#}$
Average in the Four Quarters Commencing with the Treatment Firm's Initiation of Conference Calls						
$IH_{i,t}$	414	0.439 [0.431]	361	0.355 [0.322]	293	0.095$^{\#\#\#}$ [0.091]$^{\#\#\#}$
$MV_{i,t}{}^{b}$	509	2,022,426 [425,380]	509	940,203 [248,920]	509	1,082,223$^{\#\#\#}$ [50,576]$^{\#\#\#}$
$PRC_{i,tb}$	509	24.79 [21.31]	509	23.23 [18.59]	509	1.52 [2.14]$^{\#\#\#}$
$VOL_{i,t}{}^{c}$	509	1,654 [375]	509	763 [162]	509	891$^{\#\#\#}$ [138]$^{\#\#\#}$
$NUMAN_{i,t}$	324	4.94 [3.75]	253	3.67 [2.67]	155	1.68$^{\#\#\#}$ [1.00]$^{\#\#\#}$

Panel B: Pair-wise Comparisons of Changes in Information Environment and Trading Cost Variables

Variables	n	Mean [Median] Change in Pre- and Post-Conference Call Means for Treatment Firms	n	Mean [Median] Change in Pre- and Post-Conference Call Means for Control Firms	n	Mean [Median] Pair-wise Difference in Changes^{a}
$IH_{i,t}$	393	0.056 [0.030]	347	0.017 [0.007]	262	0.037$^{\#\#\#}$ [0.0161]$^{\#\#\#}$
$MV_{i,t}{}^{b}$	509	335,116 [49,275]	509	124,073 [14,601]	509	211,043$^{\#\#\#}$ [13,624]$^{\#\#\#}$
$PRC_{i,t}$	509	1.84 [1.20]	509	0.46 [0.50]	509	1.38$^{\#\#\#}$ [0.59]$^{\#\#\#}$
$VOL_{i,t}{}^{c}$	509	485 [74]	509	188 [7]	509	297$^{\#\#\#}$ [43]$^{\#\#\#}$
$NUMAN_{i,t}$	289	0.79 [0.58]	227	0.33 [0.00]	131	0.49$^{\#\#\#}$ [0.42]$^{\#\#\#}$

(*continued on next page*)

TABLE 2 (continued)

***, ** Significant at a p-value of less than 0.01 and 0.05, respectively, using a two-tailed test.

[a] The significance of mean pair-wise differences are based on one sample t-tests while the significance of median pair-wise differences are based on the Wilcoxon sign-rank test. All p-values are two-tailed.

[b] Dollars in thousands.

[c] Dollars in millions.

$IH_{i,t}$ = the proportion of firm i's shares held by institutional investors as of the end of quarter t;
$MV_{i,t}$ = firm i's market capitalization as of beginning of the fiscal year to which quarter t belongs;
$PRC_{i,t}$ = firm i's stock price as of the beginning of the fiscal year to which quarter t belongs;
$VOL_{i,t}$ = annual trading volume of firm i's during the fiscal year immediately preceding the fiscal year to which quarter t belongs; and
$NUMAN_{i,t}$ = the number of forecasting analysts for firm i on I/B/E/S at the end of the month preceding quarter t's earnings announcement.

$$FERR2_{i,t+1} = PRE_{i,t} \times [a_0 + a_1 FERR1_{i,t}] + POST_{i,t} \times [a_0' + a_1' FERR1_{i,t}] + \varepsilon_{i,t+1} \quad (1)$$

where:

$$FERR2_{i,t+1} = \frac{(ACT_{i,t+1} - EST_{i,t+1})}{PRICE_{i,t}};$$

$$FERR1_{i,t} = \frac{(ACT_{i,t} - EST_{i,t})}{PRICE_{i,t}};$$

$ACT_{i,t}(ACT_{i,t+1})$ = actual earnings per share for quarter t (quarter $t+1$) per I/B/E/S;
$EST_{i,t}$ = the average of the most recent forecast of firm i's earnings for quarter t made by all analysts whose most recent forecast of quarter t's earnings as of 10 days prior to quarter t's earnings announcement was less than 90 days old and who subsequently revised their forecast of firm i's earnings for quarter $t+1$ sometime during the 30 days subsequent to quarter t's earnings announcement. If firm i is a treatment firm that held a conference call related to quarter t's earnings announcement (i.e., $CC_{i,t} = 1$), the revised forecast must have been made after both the earnings announcement and the related conference call;
$EST_{i,t+1}$ = the average of the prevailing forecast of firm i's earnings for quarter $t+1$ as of 30 days subsequent to quarter t's earnings announcement made by all analysts whose most recent forecast of quarter t's earnings as of 10 days prior to quarter t's earnings announcement was less than 90 days old and who subsequently revised their forecast of firm i's earnings for quarter $t+1$ sometime during the 30 days subsequent to quarter t's earnings announcement. If firm i is a treatment firm that held a conference call related to quarter t's earnings announcement (i.e., $CC_{i,t} = 1$), the revised forecast must have been made after both the earnings announcement and the related conference call;
$PRICE_{i,t}$ = firm i's stock price at the end of quarter t;

$CC_{i,t}$ = 1 if firm i is a treatment firm that conducted a conference call during the three-day period spanning one day before to one day after the announcement of quarter t's earnings according to FirstCall's conference call database, and 0 otherwise. If firm i is a control firm, then $CC_{i,t}$ = 1 if quarter t is on or after the corresponding treatment firm's initial conference call quarter;
$PRE_{i,t}$ = 1 when $CC_{i,t} = 0$, and 0 otherwise; and
$POST_{i,t}$ = 1 when $CC_{i,t} = 1$, and 0 otherwise.

Use of a cutoff of 10 days prior to quarter t's earnings announcement to measure *FERR1* is designed to avoid contamination of *FERR1* with analyst exposure to possible earnings preannouncements. Use of a cutoff of 30 days subsequent to quarter t's earnings announcement to measure *FERR2* is designed to avoid the confounding effect of the arrival of other information. The requirement for treatment firms that all forecasts included in *FERR2* during conference call quarters be revised after both the earnings announcement and the related conference call is designed to ensure that the forecasts reflect exposure to both the earnings announcement and the related conference call.[9]

Consistent with Mikhail et al. (2003), I evaluate the significance of the coefficients as well as the significance of differences between various coefficients using two alternative Z-statistics (described in Table 3) calculated using the distribution of t-statistics from the individual firm-level regressions.[10] A positive coefficient on $FERR1_{i,t}$ indicates positive serial correlation in analyst forecast errors, suggesting that analysts do not completely revise their forecasts of $t+1$ earnings to reflect the predictable implications of the unexpected earnings for quarter t. The difference in the coefficients on $FERR1_{i,t}$ in pre- versus post-conference call periods provides a test of H1. If conference calls held at the time quarter t's earnings are announced help analysts react more completely to quarter t's unexpected earnings then $a_1 > a'_1$.

Panel A of Table 3 presents the results of estimating Equation (1).[11] The mean coefficient on $FERR1_{i,t}$ declines from 0.32 in pre-conference call quarters ($p < 0.01$; one-tailed) to 0.15 in post-conference call quarters ($p < 0.01$; one-tailed). The decline of 0.17 is significant ($p < 0.01$; one-tailed), consistent with H1.[12] To ensure that this finding is not a

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[9] For example, if firm i held its conference call related to quarter t's earnings announcement one day after the earnings announcement, only analysts who revised their quarter $t+1$ forecasts sometime between the second and 30th day after quarter t's earnings announcement are included in the calculation of *FERR2*. If firm i held its conference call on the same day as quarter t's earnings announcement, analysts who revised their quarter $t+1$ forecasts anytime between the first and 30th day after quarter t's earnings announcement are included in the calculation of *FERR2*.

[10] I obtain similar inferences if I calculate univariate t-statistics based on the distribution of the individual firm-level parameter estimates and if, instead of estimating and summarizing individual firm-level regressions, I perform a single pooled regression on treatment and control firm observations.

[11] The tabulated results for all estimations of Equation (1) presented in Panels A and B of Table 3 exclude observations with a Cook's D greater than 1 or a studentized residual with an absolute value greater than 2. The results are insensitive to including these observations.

[12] Because the procedures for identifying control firms do not yield perfect matches, results for the treatment firms may be driven by contemporaneous increases in these firms' information environments. In order to provide further assurance (beyond the use of control firms) that my results are not simply due to overall increases in these firms' information environments, I classify treatment firms with a percentage change in average market value from pre- to post-conference call periods (a proxy for the overall change in the information environment) above (below) the sample-wide median as having high (low) changes in information environment. Untabulated results reveal that the significant reduction in the serial correlation in analyst forecast errors is of similar strength for both groups, indicating that the overall results are not driven by the subset of treatment firms with the most significant increases in overall information environment. I obtain similar results if I use the raw dollar change in market value as the partitioning variable.

TABLE 3
Intertemporal Test of the Firm-Specific Relation between the Serial Correlation in Analyst Forecast Errors and the Initiation of Conference Calls

Panel A: Summary of Firm-Specific Regressions for all Treatment Firms (Number of Regressions = 141)

$$FERR2_{i,t+1} = PRE_{i,t} \times [a_0 + a_1 FERR1_{i,t}] + POST_{i,t} \times [a_0' + a_1' FERR1_{i,t}] + \varepsilon_{i,t+1} \qquad (1)$$

		Pre-Conference Call Quarters		Post-Conference Call Quarters		Pre- versus Post-Conference Call Quarters
Variable	**Expected Sign**	**Mean Estimate (Z-Statistic) [Z′-Statistic]**	**Number (Percent) of Regressions with t > 0**	**Mean Estimate (Z-Statistic) [Z′-Statistic]**	**Number (Percent) of Regressions with t > 0**	**Difference in Parameter Estimates (Z-Statistic) [Z′-Statistic]**
Intercept	?	−0.0001 (1.14) [1.66]#	72 (51.1)	−0.0001 (−0.92) [−1.39]	74 (52.5)	0.0000 (−1.75)# [−2.43]##
$FERR1_{i,t}$	+	0.3184 (5.94)*** [9.58]***	98 (69.5)	0.1526 (3.27)*** [4.47]***	87 (61.7)	−0.1658 (−2.34)*** [−2.96]***

Average Adjusted R^2 = 31.02%.

(continued on next page)

TABLE 3 (continued)

Panel B: Summary of Regressions on the Treatment and Control Firm Pairs (Number of Regressions = 104)

$$FERR2_{i,t+1} = PRE_{i,t} \times [b_0CONTROL_{i,t} + b_1TREAT_{i,t} + b_2FERR1_{i,t} \times TREAT_{i,t} + b_3FERR1_{i,t} \times CONTROL_{i,t}] + POST_{i,t} \times [b'_0CONTROL_{i,t} + b'_1TREAT_{i,t} + b'_2FERR1_{i,t} \times TREAT_{i,t} + b'_3FERR1_{i,t} \times CONTROL_{i,t}] + \varepsilon'_{i,t+1} \quad (1a)$$

			Pre-Conference Call Quarters		Post-Conference Call Quarters		Pre- versus Post-Conference Call Quarters
Row	**Variable**	**Expected Sign**	**Mean Estimate (Z-Statistic) [Z′-Statistic]**	**Number (Percent) of Regressions with t > 0**	**Mean Estimate (Z-Statistic) [Z′-Statistic]**	**Number (Percent) of Regressions with t > 0**	**Difference in Parameter Estimates (Z-Statistic) [Z′-Statistic]**
1	$CONTROL_{i,t}$	?	−0.0002 (1.00) [1.55]	58 (54.3)	−0.0006 (−1.97)## [−3.27]###	47 (45.2)	−0.0004 (−2.05)## [−3.32]###
2	$TREAT_{i,t}$	?	−0.0001 (−0.02) [0.00]	55 (52.9)	−0.0001 (−1.26) [−1.58]	55 (52.9)	0.0000 (−0.80) [−0.97]
3	$FERR1_{i,t} \times TREAT_{i,t}$	+	0.2924 (5.29)*** [7.98]***	73 (70.2)	0.0839 (2.42)*** [2.54]***	61 (58.7)	−0.2085 (−2.61)*** [−3.00]***
4	$FERR1_{i,t} \times CONTROL_{i,t}$	+	0.1214 (2.16)** [2.70]***	58 (57.1)	0.1524 (3.43)*** [6.22]***	63 (60.6)	0.0310 (1.29) [1.42]
5	Row 3 − Row 4		0.1710 (2.04)** [2.08]**	61 (58.7)	−0.0685 (−0.74) [−0.71]	50 (48.1)	−0.2395 (−2.22)** [−1.93]**

Average Adjusted $R^2 = 35.10\%$

(*continued on next page*)

TABLE 3 (continued)

***, ** Significant at a p-value of less than 0.01 and 0.05, respectively, using a one-tailed test.

***, **, * Significant at a p-value of less than 0.01, 0.05, and 0.10, respectively, using a two-tailed test.

Panel A of Table 3 provides the summary results from estimating Equation (1) on each of the 141 firms in the sample. Equation (1) stacks pre- and post-conference call observations in a single regression. $PRE_{i,t} = 1$ when $CC_{i,t} = 0$, and 0 otherwise. $POST_{i,t} = 1$ when $CC_{i,t} = 1$, and 0 otherwise. $CC_{i,t}$ is defined as in Table 1.

Each coefficient estimate is the mean of the estimates from the 141 separate regressions. The significance of the coefficient estimates and the significance of the difference in the coefficient estimates between pre- and post-conference call periods are assessed using the following two Z-statistics that are calculated based on the distribution of t-statistics from the 141 separate regressions. Z assumes independence and unit variance while Z′ does not assume unit variance.

$$Z = \sqrt{N-1}\,\frac{\bar{t}}{\sigma(t)} \text{ and } Z' = \sqrt{N}\left(\frac{\sum_{i=1}^{N} t_i \sqrt{\frac{v_i - 2}{v_i}}}{N}\right)$$

where N = the number of t-statistics to be aggregated, $\bar{t}$ = the mean of the t-statistics across the 141 regressions, $\sigma(t)$ represents the standard deviation of the t-statistics, and v_i = degrees of freedom for t_i.

Panel B of Table 3 provides the summary results from estimating Equation (1a) on each of the 104 treatment/control firm pairs. As in Equation (1), Equation (1a) stacks pre- and post-conference call observations in a single regression. In addition, Equation (1a) reflects separate coefficient estimates for treatment and control firms. Thus, $TREAT_{i,t}$ ($CONTROL_{i,t}$) is an indicator equal to 1 for treatment firm (control) firm observations, and 0 otherwise. The significance of the coefficient estimates and the significance of the differences in the coefficient estimates for the treatment and control firm observations are assessed using the two Z-statistics defined above.

See Table 1 for remaining variable definitions.

result of general experience effects documented by Mikhail et al. (2003), I also estimate the following variant of Equation (1) on each of the 104 treatment-control pairs.

$$\begin{aligned} FERR2_{i,t+1} = {} & PRE_{i,t} \times \begin{bmatrix} b_0 CONTROL_{i,t} + b_1 TREAT_{i,t} + b_2 FERR1_{i,t} \\ \times\ TREAT_{i,t} + b_3 FERR1_{i,t} \times CONTROL_{i,t} \end{bmatrix} \\ & + POST_{i,t} \times \begin{bmatrix} b'_0 CONTROL_{i,t} + b'_1 TREAT_{i,t} + b'_2 FERR1_{i,t} \\ \times\ TREAT_{i,t} + b'_3 FERR1_{i,t} \times CONTROL_{i,t} \end{bmatrix} \\ & + \varepsilon_{i,t+1} \end{aligned} \tag{1a}$$

where:

$TREAT_{i,t}$ = 1 for treatment firm observations, and 0 otherwise; and
$CONTROL_{i,t}$ = 1 for control firm observations, and 0 otherwise.

Equation (1a) allows the intercepts and coefficients on $FERR1_{i,t}$ in both pre- and post-conference call quarters to vary for treatment and control firms. I test whether the change in the coefficient on $FERR1_{i,t}$ exhibited by the treatment firms is significantly different from the corresponding change exhibited by the control firms. Panel B of Table 3 presents the results of estimating Equation (1a). In pre-conference call quarters, the mean coefficient on $FERR1_{i,t}$ for the treatment firms of 0.29 ($p < 0.01$; one-tailed) is significantly greater than the corresponding mean for the control firms of 0.12 ($p < 0.01$; one-tailed) at $p < 0.05$; one-tailed. Hence, treatment firms appear to suffer from more severe analyst underreaction in pre-conference call quarters, suggesting that inefficient analyst reactions to earnings announcements is a possible motivation for conference call initiation. In post-conference call quarters, the mean coefficient on $FERR1_{i,t}$ for the treatment firms of 0.08 ($p < 0.01$; one-tailed) is insignificantly different from the corresponding mean for the control firms of 0.15 ($p < 0.01$; one-tailed). Hence, analyst underreaction for the treatment firms declines in post-conference call quarters to a level that is indistinguishable from the control firms. The decline in the coefficient on $FERR1_{i,t}$ for the treatment firms of 0.21 is significant at $p < 0.01$; one-tailed while the increase in the coefficient on $FERR1_{i,t}$ for the control firms of 0.03 is insignificant. The change in the coefficient on $FERR1_{i,t}$ for the treatment firms is significantly different from the corresponding change for the control firms at $p < 0.05$; one-tailed. Taken collectively, the evidence in Panel B of Table 3 indicates that the reduction in the serial correlation in analyst forecast errors that treatment firms experience surrounding the initiation of conference calls does not extend to control firms that did not initiate conference calls over the same time period.[13] Therefore, it is unlikely that the reduction in analyst underreaction exhibited by treatment firms is attributable to the general experience effects documented by Mikhail et al. (2003).

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[13] Past research has shown the sign of earnings to be related to the sign of analyst forecast errors (see, for example, Brown 2001). Therefore, I perform untabulated supplemental analyses to ensure that the results are not driven by different profit patterns for treatment and control firms. I find that the treatment and control firms have fairly small but statistically significant differences in the proportion of profit quarters during both pre- and post-conference call quarters. However, I find insignificant differences between the treatment and control firms in the proportion of quarters with positive analyst forecast errors in both pre- and post-conference call quarters. Therefore, for my sample, differences in the profit pattern of treatment and control firms do not translate into systematic differences between treatment and control firms in the sign of analyst forecast errors. In addition, I find that treatment firms experience no statistically significant change in the incidence of profits surrounding the conference call initiation decision, indicating that a change in the profit pattern is not contributing to the documented decline in the serial correlation in analyst forecast errors for these firms. Moreover, although the control firms experience a fairly small but statistically significant decline in the incidence of profits surrounding the treatment firms' conference call initiation, they do not experience a statistically significant change in the serial correlation in analyst forecast errors surrounding the treatment firms' conference call initiation. This latter finding also suggests that the pattern of profits does not contribute to the documented findings.

Intertemporal Test of the Association between Conference Call Use and Drift

Change in Drift for Treatment Firms Surrounding Conference Call Initiation

I relate conference calls to investor underreaction by examining their association with post-earnings announcement drift. Specifically, I estimate the following regression on the 3,678 firm-quarter observations pertaining to my 518 treatment firms.

$$\begin{aligned} BHAR_{i,t+1} = {} & PRE_{i,t} \times [\mathrm{c}_0 + \mathrm{c}_2 DSUE_{i,t} + \mathrm{c}_2 DSUE_{i,t} \times DRIFTFACTORS_i] \\ & + POST_{i,t} \times [\mathrm{c}'_0 + \mathrm{c}'_1 DSUE_{i,t} + \mathrm{c}'_2 DSUE_{i,t} \times DRIFTFACTORS_i] \\ & + \varepsilon''_{i,t+1} \end{aligned} \tag{2}$$

where:

$BHAR_{i,t+1}$ = the compounded abnormal return for firm i for the period beginning on the second day after quarter t's earnings announcement and ending on the earnings announcement date for quarter $t+1$. It is calculated as the compounded raw return over the return accumulation period less the compounded equally weighted average return over the same return accumulation period for all firms in the same CRSP size decile on the same CRSP exchange index (i.e., NYSE/AMEX or NASDAQ) to which firm i belongs;

$DSUE_{i,t}$ = the decile ranking (among all firms meeting initial CRSP and Compustat data requirements) of firm i's standardized unexpected earnings for quarter t, scaled to be between 0 and 1;

$DRIFTFACTORS_i$ = $DRIFTFACTORSpre_i$ for all observations prior to firm i's first conference call and $DRIFTFACTORSpost_i$ for all observations commencing with firm i's first conference call; and

$DRIFTFACTORSpre_i$ = the average of firm i's scores on the following three dimensions: (1) the average decile ranking (among all firms meeting initial CRSP and Compustat data requirements) during pre-conference call quarters of firm i's market capitalization as of the beginning of the fiscal year to which the quarter belongs, scaled to be between 0 and 1, (2) the average during pre-conference call quarters of $BPRC_{i,t}$, which equals 1 if firm i's stock price as of the beginning of the fiscal year to which the quarter belongs is greater than \$10, and 0 otherwise, and (3) the average decile ranking (among all firms meeting initial CRSP and Compustat data requirements) during pre-conference call quarters of firm i's trading volume over the fiscal year preceding the fiscal year to which the quarter belongs, scaled to be between 0 and 1; and

$DRIFTFACTORSpost_i$ = the average of firm i's scores on the following three dimensions: (1) the average decile ranking (among all firms meeting initial CRSP and Compustat data requirements) during post-conference call quarters of firm i's market capitalization as of the beginning of the fiscal year to which the quarter belongs, scaled to be between 0 and 1, (2) the average during post-conference call quarters of $BPRC_{i,t}$, which equals 1 if firm i's stock price as of the beginning of the fiscal year to which the quarter belongs is greater than \$10, and 0 otherwise, and (3) the average decile ranking (among all firms meeting initial CRSP and Compustat data requirements) during post-conference call quarters of firm i's trading volume over the fiscal year preceding the fiscal year to which the quarter belongs, scaled to be between 0 and 1.

Bernard and Thomas (1990) demonstrate that, when standardized unexpected earnings ($SUE_{i,t}$) is scaled to be between 0 and 1, the coefficient on $DSUE_{i,t}$ can be interpreted as the returns to a zero-investment portfolio strategy based on the cross-sectional distribution of previously announced seasonally differenced earnings, where the optimal portfolio weights are determined using ordinary least squares. Prior research has documented a positive coefficient on $DSUE_{i,t}$, which is evidence of profitable trading opportunities based on market underreaction to current earnings surprises. The abnormal return measure used as the dependent variable in tests of drift captures the market's subsequent correction for previous underreaction that had not yet been resolved as of the start of the return accumulation period. In the current study, because the return accumulation period for *BHAR* starts on the second day after quarter t's earnings announcement, c_1 (c'_1) captures investors' subsequent correction of their *initial* underreaction to currently announced earnings during quarters prior to (commencing with) the initial conference call quarter.

I calculate unexpected earnings of firm i in quarter t ($UE_{i,t}$) based on a seasonal random walk model where earnings are earnings before extraordinary items and discontinued operations. I scale $UE_{i,t}$ by market capitalization at the end of quarter t to obtain standardized unexpected earnings for firm i in quarter t ($SUE_{i,t}$). For each calendar quarter, I form deciles on the basis of $SUE_{i,t}$ with 0 representing the smallest magnitudes of *SUE* and 9 representing the largest. $DSUE_{i,t}$, which is the measure of unexpected earnings used in empirical tests, represents the $SUE_{i,t}$ decile rank scaled to be between 0 and 1 (i.e., $DSUE_{i,t}$ = $SUE_{i,t}$ decile rank divided by 9).

$DRIFTFACTORS_i$ represents a composite measure of factors that prior studies have shown to be associated with drift.[14] I include market capitalization based on Foster et al.'s (1984) finding of an inverse relation between firm size and the magnitude of drift. Based on the work of Bhushan (1994), I include stock price and trading volume in order to control for transactions costs. The threshold for the binary classification of stock price is identical to that used in Bhushan (1994) and Bartov et al. (2000). Because of the way the variables that comprise $DRIFTFACTORS_i$ are scaled, $DRIFTFACTORS_i$ has a minimum value of 0 (for firms that were consistently in the bottom deciles of market capitalization and trading volume and that had a stock price consistently less than \$10) and maximum value of 1 (for firms that were consistently in the top deciles of market capitalization and trading volume and that had a stock price consistently greater than \$10). Because I calculate $DRIFTFACTORS_i$ in pre- (post-) conference call periods based on firms' average measures in pre- (post-) conference call quarters, Equation (2) implicitly controls for contemporaneous changes in the information environment and trading costs that may also serve to reduce drift. Coefficient c_2 (c'_2) represents the marginal effect of increases in factors that have previously been shown to be negatively associated with drift on the profitability of the post-earnings announcement drift strategy in pre- (post-) conference call periods. Accordingly, I both expect c_2 and c'_2 to be less than 0 .[15]

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[14] I choose to create a composite measure of factors that contribute to drift rather than allowing these factors to enter equation (3) as separate interactions for the sake of parsimony (since I am not primarily interested in the individual impact of each factor) and in order to minimize multicollinearity arising from the high degree of correlation among the individual factors, which is likely to be more problematic in my relatively small sample than in large-scale studies of drift.

Panel A of Table 4 presents the results of estimating Equation (2) on the treatment and control firms. In pre-conference call quarters, the coefficient on $DSUE_{i,t}$ for treatment firms equals 17.47 percent ($p < 0.01$; one-tailed), which indicates that treatment firms where

TABLE 4
Portfolio Test of the Intertemporal Relation between Conference Calls and Drift

Panel A: All Treatment Firm Observations (n = 3,678)

$$BHAR_{i,t+1} = PRE \times [c_0 + c_1 DSUE_{i,t} + c_2 DSUE_{i,t} \times DRIFTFACTORS_i] + POST \times [c'_0 + c'_1 DSUE_{i,t} + c'_2 DSUE_{i,t} \times DRIFTFACTORS_i] + \varepsilon''_{i,t+1} \qquad (2)$$

Row	Variable	Expected Sign	Pre-Conference Call Quarters	Post-Conference Call Quarters	Difference between Pre- and Post-Conference Call Quarters
			Parameter Estimate (t-statistic)	**Parameter Estimate (t-statistic)**	**Parameter Estimate (t-statistic)**
1	Intercept	?	−1.16 (−1.01)	−2.20 (−1.89)#	−1.04 (−0.64)
2	$DSUE_{i,t}$	+	17.47 (7.38)***	9.09 (3.11)***	−8.38 (−2.23)**
3	$DSUE_{i,t} \times DRIFTFACTORS_i$	−	−19.45 (−6.29)***	−7.00 (−1.92)**	12.45 (2.61)###
4	Row 2 + Row 3		−1.98 (−0.82)	2.09 (0.86)	3.97 (1.18)

Adjusted $R^2 = 1.83\%$.

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[15] In untabulated sensitivity analysis, I recompute $DRIFTFACTORS_i$ for those firms with institutional ownership and/or analyst coverage to include the following additional factors: the average decile ranking during pre- or post- conference call quarters (as applicable) of firm *i*'s percentage of institutional ownership and the average decile ranking during pre-conference call quarters of firm *i*'s analyst following, both scaled to be between 0 and 1. I run all subsequent analyses using this revised measure of $DRIFTFACTORS_i$ (while continuing to use $DRIFTFACTORS_i$ as computed according to the procedures set forth in the main text for the firms not covered by I/B/E/S or CDA/Spectrum). The subsequently reported results are insensitive to this alternative specification.

TABLE 4 (continued)

Panel B: Analysis of Treatment Firms with a Corresponding Control and the Corresponding Control Firms (n = 7,228)

$$
\begin{aligned}
BHAR_{i,t+1} = PRE_{i,t} \times & \begin{bmatrix} d_0 CONTROL_{i,t} + d_1 TREAT_{i,t} + d_2 DSUE_{i,t} \times TREAT_{i,t} \\ + d_3 DSUE_{i,t} \times DRIFTFACTORS_i \times TREAT + d_4 DSUE_{i,t} \\ \times CONTROL_{i,t} + d_5 DSUE_{i,t} \times DRIFTFACTORS_i \times CONTROL_{i,t} \end{bmatrix} \\
+ POST_{i,t} \times & \begin{bmatrix} d'_0 CONTROL_{i,t} + d'_1 TREAT_{i,t} + d'_2 DSUE_{i,t} \times TREAT_{i,t} \\ + d'_3 DSUE_{i,t} \times DRIFTFACTORS_i \times TREAT \\ + d'_4 DSUE_{i,t} \times CONTROL_{i,t} + d'_5 DSUE_{i,t} \\ \times DRIFTFACTORS_i \times CONTROL_{i,t} \end{bmatrix} \\
+ \varepsilon'''_{i,t+1} & \qquad (2a)
\end{aligned}
$$

			Pre-Conference Call Quarters	Post-Conference Call Quarters	Difference between Pre- and Post-Conference Call Quarters
Row	Variable	Expected Sign	Parameter Estimate (t-statistic)	Parameter Estimate (t-statistic)	Parameter Estimate (t-statistic)
1	$CONTROL_{i,t}$	?	−2.87 (−2.70)###	−5.70 (−5.56)###	−2.83 (−1.92)#
2	$TREAT_{i,t}$	?	−0.92 (−0.82)	−2.42 (−2.13)##	−1.50 (0.94)
3	$DSUE_{i,t} \times TREAT_{i,t}$	+	17.57 (7.62)***	8.81 (3.04)***	−8.76 (2.37)***
4	$DSUE_{i,t} \times DRIFTFACTORS_i \times TREAT_{i,t}$	−	−19.99 (−6.65)***	−6.24 (−1.74)**	13.75 (2.93)###
5	$DSUE_{i,t} \times CONTROL_{i,t}$	+	6.25 (2.49)***	7.12 (2.67)***	0.87 (0.24)
6	$DSUE_{i,t} \times DRIFTFACTORS_i \times CONTROL_{i,t}$	−	−4.35 (−1.29)*	−2.18 (−0.61)	2.17 (0.44)
7	Row 3 − Row 5	?	11.32 (3.32)###	1.69 (0.42)	−9.63 (−1.85)**
8	(Row 3 + Row 4) − (Row 5 + Row 6)	?	−4.32 (−1.26)	−2.37 (−0.69)	1.95 (0.40)

Adjusted R^2 = 1.66%.

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$DRIFTFACTORS_i$ equals 0 suffer from severe underreaction.[16] The coefficient on $DSUE_{i,t} \times DRIFTFACTORS_i$ for the treatment firms in pre-conference call periods is −19.45 percent ($p < 0.01$; one-tailed), consistent with the expectation that drift declines as firms become

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[16] Note that the 17.47 percent does not represent the profitability of the drift strategy for the entire sample, only for those firms ranking at the bottom on all the dimensions comprising *DRIFTFACTORS* (in other words, those firms with characteristics that predispose them to the most severe drift). The strategy for the treatment sample as a whole without conditioning on *DRIFTFACTORS* yields a return of 6.67 percent (based on a simple regression of $BHAR_{i,t+1}$ on $DSUE_{i,t}$).

TABLE 4 (continued)

***, **, * Significant at a p-value of less than 0.01, 0.05, and 0.10, respectively, using a one-tailed test.

####, ## Significant at a p-value of less than 0.01 and 0.05, respectively, using a two-tailed test.

[a] The test of differences in the intercept and coefficient estimates from pre- to post-conference call quarters is based on a pooled regression of pre- and post-conference call observations that incorporates intercept and slope shifts for post-conference call observations.

Equations (2) and (2a) stack pre- and post-conference call observations in a single regression. $PRE_{i,t}$ = 1 when $CC_{i,t}$ = 0, and 0 otherwise. $POST_{i,t}$ = 1 when $CC_{i,t}$ = 1, and 0 otherwise. $CC_{i,t}$ is defined as in Table 1. In addition, Equation (2a) reflects separate coefficient estimates for treatment and control firms. Thus, $TREAT_{i,t}$ ($CONTROL_{i,t}$) is an indicator equal to 1 for treatment firm (control) firm observations, and 0 otherwise.

Variable Definitions:

$DSUE_{i,t}$ = the decile ranking of firm *i*'s standardized unexpected earnings for quarter *t*, scaled to be between 0 and 1;

$DRIFTFACTORS_i$ = $DRIFTFACTORSpre_i$ for all observations prior to firm *i*'s first conference call and $DRIFTFACTORSpost_i$ for all observations commencing with firm *i*'s first conference call;

$DRIFTFACTORSpre_i$ = the average of firm *i*'s scores on the following three dimensions: (1) the average decile ranking (among all firms meeting initial CRSP and Compustat data requirements) during pre-conference call quarters of firm *i*'s market capitalization as of the beginning of the fiscal year to which the quarter belongs, scaled to be between 0 and 1, (2) the average during pre-conference call quarters of $BPRC_{i,t}$, which equals 1 if firm *i*'s stock price as of the beginning of the fiscal year to which the quarter belongs is greater than $10, and 0 otherwise, and (3) the average decile ranking (among all firms meeting initial CRSP and Compustat data requirements) during pre-conference call quarters of firm *i*'s trading volume over the fiscal year preceding the fiscal year to which the quarter belongs, scaled to be between 0 and 1; and

$DRIFTFACTORSpost_i$ = the average of firm *i*'s scores on the following three dimensions: (1) the average decile ranking (among all firms meeting initial CRSP and Compustat data requirements) during post-conference call quarters of firm *i*'s market capitalization as of the beginning of the fiscal year to which the quarter belongs, scaled to be between 0 and 1, (2) the average during post-conference call quarters of $BPRC_{i,t}$, which equals 1 if firm *i*'s stock price as of the beginning of the fiscal year to which the quarter belongs is greater than $10, and 0 otherwise, and (3) the average decile ranking (among all firms meeting initial CRSP and Compustat data requirements) during post-conference call quarters of firm *i*'s trading volume over the fiscal year preceding the fiscal year to which the quarter belongs, scaled to be between 0 and 1.

All other variables are as defined previously. See Table 1 for remaining variable definitions.

larger and more actively traded. The sum of the coefficients on $DSUE_{i,t}$ and $DSUE_{i,t} \times DRIFTFACTORS_i$ in pre-conference call quarters equals −1.98 percent, which is insignificant, indicating that drift does not exist for treatment firms where $DRIFTFACTORS_i$ equals 1 (i.e., the largest and most heavily traded firms). In post-conference call quarters, the coefficient on $DSUE_{i,t}$ for treatment firms is 9.09 percent ($p < 0.01$; one-tailed), which represents a decline of 8.38 percent ($p < 0.05$; one-tailed) in the magnitude of underreaction for firms where *DRIFTFACTORS* equals 0 (i.e., the smallest, least heavily traded firms), consistent with H2. The sum of the coefficients on $DSUE_{i,t}$ and $DSUE_{i,t} \times DRIFTFACTORS_i$ in post-conference call quarters equals 2.09 percent, which is both insignificantly different from 0 and insignificantly different from the sum of the coefficients on these same variables in pre-conference call quarters. Hence, the largest, most heavily traded sample firms do not exhibit significant drift either before or after conference call initiation. The nonexistence of drift for the largest firms is consistent with evidence in Brown and Han (2000), who find in their study of firms whose earnings follow a simple first-order autoregressive process that stock prices fully reflect the future implications of current earnings surprises for the largest firms in their sample.

Comparative Analysis of the Change in Drift for Treatment and Control Firms

To formally test whether the previously documented decline in underreaction for the treatment firms is significantly different from the control firms, I estimate the following expanded version of Equation (2) on the 7,228 firm-quarter observations related to the 509 treatment firms for which a control firm could be identified (3,616 firm-quarters) and the corresponding 509 control firms (3,612 firm-quarters).

$$
\begin{aligned}
BHAR_{i,t+1} = PRE_{i,t} \times & \begin{bmatrix} d_0 CONTROL_{i,t} + d_1 TREAT_{i,t} + d_2 DSUE_{i,t} \\ \times TREAT_{i,t} + d_3 DSUE_{i,t} \times DRIFTFACTORS_i \\ \times TREAT + d_4 DSUE_{i,t} \times CONTROL_{i,t} + d_5 DSUE_{i,t} \\ \times DRIFTFACTORS_i \times CONTROL_{i,t} \end{bmatrix} \\
+ POST_{i,t} \times & \begin{bmatrix} d'_0 CONTROL_{i,t} + d'_1 TREAT_{i,t} + d'_2 DSUE_{i,t} \\ \times TREAT_{i,t} + d'_3 DSUE_{i,t} \times DRIFTFACTORS_i \\ \times TREAT + d'_4 DSUE_{i,t} \times CONTROL_{i,t} \\ + d'_5 DSUE_{i,t} \times DRIFTFACTORS_i \times CONTROL_{i,t} \end{bmatrix} \\
+ \varepsilon'''_{i,t+1}. & \qquad (2a)
\end{aligned}
$$

Equation (2a) incorporates separate intercepts and slope coefficients for treatment and control firm observations in pre- and post-conference call observations. Specifically, d_0 (d'_0) represents the intercept for control firm observations in pre- (post-) conference call quarters while d_1 (d'_1) represents the intercept for treatment firm observations in pre- (post-) conference call quarters. Coefficient d_2 (d'_2) represents the coefficient on $DSUE_{i,t}$ in pre- (post-) conference call quarters for treatment firm observations while coefficient d_3 (d'_3) represents the coefficient on $DSUE_{i,t} \times DRIFTFACTORS_i$ in pre- (post-) conference call quarters for treatment firm observations. Coefficient d_4 (d'_4) represents the coefficient on $DSUE_{i,t}$ in pre- (post-) conference call quarters for control firm observations while coefficient d_5 (d'_5) represents the coefficient on $DSUE_{i,t} \times DRIFTFACTORS_i$ in pre- (post-) conference call quarters for control firm observations.

Panel B of Table 4 presents the results of estimating Equation (2a). In pre-conference call quarters, the coefficient on $DSUE_{i,t}$ for treatment firms of 17.57 percent ($p < 0.01$; one-tailed) is significantly different from the corresponding coefficient for control firms of 6.25 percent ($p < 0.01$; one-tailed) at $p < 0.01$; two-tailed. This pattern is consistent with the significantly higher serial correlation in analyst forecast errors noted for treatment firms in Panel B of Table 3 and suggests that, while the treatment firms rank significantly higher than their control firm counterparts on traditional measures of information and trading environment (as seen in Table 2), analysts and investors appear to be less able to understand treatment firms' earnings announcement in the quarters prior to their initiation of conference calls. It is conceivable that inefficiency in market reactions to their earnings announcements may motivate firms to initiate conference calls.

In post-conference call quarters, the coefficient on $DSUE_{i,t}$ for treatment firms of 8.81 percent ($p < 0.01$; one-tailed) is 8.76 percent lower ($p < 0.01$; one-tailed) than the corresponding coefficient for treatment firms in pre-conference call quarters. In post-conference call quarters, the coefficient on $DSUE_{i,t}$ for control firms of 7.12 percent (p < 0.01; one-tailed) is insignificantly different from the corresponding coefficient for control firms in pre-conference call quarters. Hence, the decline in drift exhibited by the treatment firms does not extend to the control firms Moreover, the reduction in the coefficient on $DSUE_{i,t}$ for treatment firms is significantly different from the change in the coefficient on $DSUE_{i,t}$ for control firms at $p < 0.05$; one-tailed, indicating that the drift reduction for the treatment firms is not due to the passage of time.

The sum of the coefficients on $DSUE_{i,t}$ and $DSUE_{i,t} \times DRIFTFACTORS_{i,t}$ is insignificant in both pre- and post-conference call quarters for both treatment and control firms. Moreover, the sum of the coefficients on $DSUE_{i,t}$ and $DSUE_{i,t} \times DRIFTFACTORS_{i,t}$ for treatment firms is insignificantly different from the corresponding sum for the control firms in both pre- and post-conference call quarters. In addition, the change in the sum of the coefficients on $DSUE_{i,t}$ and $DSUE_{i,t} \times DRIFTFACTORS_{i,t}$ for the treatment firms is insignificantly different from the corresponding change for the control firms. Collectively, these results indicate no effect of conference calls on the largest, most heavily traded sample firms in post-conference call quarters.[17]

Examination of Post-Earnings Announcement Drift as a Proportion of the Total Stock Price Response to Earnings Announcements

Evidence in the preceding section of a differential decline in drift for treatment firms is consistent with conference calls providing information that helps mitigate investors' initial underreactions to current earnings surprises. A potential concern with interpreting tests of the magnitude of post-earnings announcement drift is that prior research has shown that the value relevance of earnings has declined over time (e.g., Collins et al. 1997; Francis and Schipper 1999). Hence, a decline over time in the magnitude of drift may be attributable to a decline in the overall strength of the earnings-return relation as opposed to the effect conference calls have in making the persistence of earnings surprises more transparent for investors.[18] This alternative explanation is more likely for firms initiating conference calls because Tasker (1998a) shows that firms are more likely to use conference calls when their earnings are less informative.[19] I perform supplemental tests of the effect of conference calls on investor underreaction by examining whether conference calls are associated with declines in the *proportion* of the total stock market reaction to quarter *t*'s earnings announcement that is attributable to drift (hereafter referred to as proportionate drift).[20] Examining proportionate drift as opposed to the raw magnitude of post-earnings announcement drift effectively controls for any changes over time in the overall strength of the earnings-return relation. If conference calls mitigate investor underreaction, the proportion of the market's total response to quarter *t*'s earnings announcement that is delayed (i.e., that is attributable to drift) should decline.

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[17] To gain further insight on the pervasiveness of the conference call-related drift reduction, I perform separate regressions of $BHAR_{i,t+1}$ against $DSUE_{i,t}$ and $DSUE_{i,t} \times CC_{i,t}$ for quintiles formed on the basis of *DRIFTFACTORS* (results not tabulated). I find that sample-wide evidence of significant pre-conference call drift as well as of significant conference call-related drift reduction resides in the two bottom quintiles while significant pre-conference call drift and conference call-related change in drift is not apparent in the top three quintiles.

[18] I thank an anonymous referee for this insight.

[19] One of Tasker's (1998a) indicators of less informative earnings is a weak earnings-return relation.

[20] Examining proportionate drift as opposed to the raw magnitude of post-earnings announcement drift effectively controls for any changes over time in the overall strength of the earnings-return relation. If conference calls mitigate investor underreaction, then the proportion of the market's total response to quarter *t*'s earnings announcement that is delayed (i.e., that is attributable to drift) should decline. Another conceivable approach to examining whether conference calls accelerate investors' responses to earnings announcements is to investigate the effect of conference calls on the magnitude of earnings response coefficients (ERC). If conference calls enhance investors' reactions to earnings announcements, conference calls should increase the intensity of investors' responses per unit of earnings news (i.e., the ERC). Such an analysis is beyond the scope of this study.

In order to measure the decline in proportionate drift surrounding conference call initiation for treatment and control firms, I estimate the following equation, which modifies Equation (2) by accumulating returns over the earnings announcement period (defined as the three days centered on the earnings announcement date) separately for pre- and post-conference call quarter observations.

$$\begin{aligned} CARANN_{i,t+1} = {} & PRE_{i,t} \times [\mathrm{f}_0 + \mathrm{f}_1 DSUE_{i,t} + \mathrm{f}_2 DSUE_{i,t} \times DRIFTFACTORS_i] \\ & + POST_{i,t} \times [\mathrm{f}'_0 + \mathrm{f}'_1 DSUE_{i,t} + \mathrm{f}'_2 DSUE_{i,t} \\ & \times DRIFTFACTORS_i] + \varepsilon''_{i,t+1} \end{aligned} \tag{3}$$

where $CARANN_{i,t}$ = the compounded abnormal return for firm *i* for the three days spanning from the day before to the day after the announcement of quarter *t*'s earnings. It is calculated as the compounded raw return over the return accumulation period less the compounded equally weighted average return over the same return accumulation period for all firms in the same CRSP size decile on the same CRSP exchange index (i.e., NYSE/AMEX or NASDAQ) to which firm *i* belongs.

Because the previously discussed evidence of a decline in the magnitude of drift is concentrated in the smallest, heavily traded sample firms, I focus my analysis of the change in proportionate drift on this set of firms (i.e., *DRIFTFACTORS* = 0). I calculate proportionate drift for this set of firms as the ratio of the market's delayed reaction to the earnings surprise (i.e., c_1 or c'_1 from Equation (2)) to the total market reaction to the earnings surprise during the combined earnings announcement and post-earnings announcement windows (i.e., the sum of f_1 from Equation (3) and c_1 from Equation (2) or the sum of f'_1 from Equation (3) and c'_1 from Equation (2)).

Panel A of Table 5 presents the results from estimating Equations (2) and (3) on treatment firms for which a control firm could be identified as well as calculations of proportionate drift based on the resulting parameter estimates. Proportionate drift for the treatment firms where *DRIFTFACTORS* equals 0 declines by 19.8 percent (from 81.76 percent in pre-conference call quarters to 61.96 percent in post-conference call quarters). This decline is significant ($p < 0.05$, one-tailed based on a Chi-Square statistic from a Wald test of nonlinear restrictions), consistent with the corresponding decline in the magnitude of drift. Panel B of Table 5 presents the results from estimating Equations (2) and (3) on the control firms as well as calculations of proportionate drift based on the resulting parameter estimates. The change in proportionate drift for control firms where *DRIFTFACTORS* equals 0 is insignificant, consistent with the insignificant change in the magnitude of drift for these firms documented previously. Untabulated computations show that the changes in proportionate drift for treatment and control firms where *DRIFTFACTORS* equals one are insignificant based on Chi-Square statistics from a Wald test of nonlinear restrictions.

In untabulated analysis, I directly compare the change in proportionate drift for treatment firms to that for the control firms based on a pooled regression of treatment and control firm observations that incorporates intercept and slope shifts for post-conference call and treatment firm observations. Based on the Wald test, the decline in proportionate drift for treatment firms where *DRIFTFACTORS* equal 0 is significantly different from the corresponding control firms where *DRIFTFACTORS* equal 0 ($p < 0.05$; one-tailed). The change in proportionate drift for treatment firms where *DRIFTFACTORS* equals 1 is not significantly different from the corresponding change for the control firms where *DRIFTFACTORS* equals 1. Overall, the evidence from the analysis of proportionate drift corroborates evidence from the previous analysis of the magnitude of drift.

Do Conference Calls Increase the Total Amount of Information That Market Participants Use about the Persistence of Previously Announced Earnings?

The foregoing evidence is consistent with conference calls *accelerating* analysts' and investors' reaction to the future implications of the current earnings announcement. A related question is whether conference calls increase the total amount of information about the persistence of currently announced earnings that analysts and investors use. To address

TABLE 5

Intertemporal Test of the Effect of Conference Calls on the Proportion of the Total Stock Market Response to Earnings Announcements Attributable to Drift

Panel A: Treatment Firms with a Corresponding Control

$$\begin{aligned} BHAR_{i,t+1} = {} & PRE_{i,t} \times [c_0 + c_1 DSUE_{i,t} + c_2 DSUE_{i,t} \times DRIFTFACTORS_i] + POST_{i,t} \\ & \times [c'_0 + c'_1 DSUE_{i,t} + c'_2 DSUE_{i,t} \times DRIFTFACTORS_i] + \varepsilon''_{i,t+1} \end{aligned} \quad (2)$$

$$\begin{aligned} CARANN_{i,t+1} = {} & PRE_{i,t} \times [f_0 + f_1 DSUE_{i,t} + f_2 DSUE_{i,t} \times DRIFTFACTORS_i] + POST_{i,t} \\ & \times [f'_0 + f'_1 DSUE_{i,t} + f'_2 DSUE_{i,t} \times DRIFTFACTORS_i] + \varepsilon''_{i,t+1} \end{aligned} \quad (3)$$

	BHAR		*CARANN*	
	Pre-Conference Call Quarters	**Post-Conference Call Quarters**	**Pre-Conference Call Quarters**	**Post-Conference Call Quarters**
Variable	**Parameter Estimate (t-statistic)**	**Parameter Estimate (t-statistic)**	**Parameter Estimate (t-statistic)**	**Parameter Estimate (t-statistic)**
Intercept	−0.92 (−0.79)	2.42 (−2.07)##	−0.83 (−2.34)##	−1.01 (−2.82)###
$DSUE_{i,t}$	17.57 (7.40)***	8.81 (2.95)***	3.92 (5.39)***	5.41 (5.92)***
$DSUE_{i,t} \times DRIFTFACTORS_i$	−19.99 (−6.46)***	−6.24 (−1.69)**	−1.52 (−1.60)#	−2.79 (−2.46)##
n	3,616		3,616	
Adj. R^2	1.91%		2.00%	

Calculation of Proportionate Drift where *DRIFTFACTORS* = 0:

	Pre-Conference Call Quarters		**Post-Conference Call Quarters**		
	Estimate	**Chi-Square Statistic**	**Estimate**	**Chi-Square Statistic**	**Chi-Square Test of Difference**
$c_1/(c_1 + f_1)$ for pre-conference call quarters $c'_1/(c'_1 + f'_1)$ for post-conference call quarters	81.76%	624.23***	61.96%	51.62***	4.60**

(*continued on next page*)

TABLE 5 (continued)

Panel B: Control Firms

$$BHAR_{i,t+1} = PRE_{i,t} \times [c_0 + c_1 DSUE_{i,t} + c_2 DSUE_{i,t} \times DRIFTFACTORS_i] + POST_{i,t} \times [c'_0 + c'_1 DSUE_{i,t} + c'_2 DSUE_{i,t} \times DRIFTFACTORS_i] + \varepsilon''_{i,t+1} \quad (2)$$

$$CARANN_{i,t+1} = PRE_{i,t} \times [f_0 + f_1 DSUE_{i,t} + f_2 DSUE_{i,t} \times DRIFTFACTORS_i] + POST_{i,t} \times [f'_0 + f'_1 DSUE_{i,t} + f'_2 DSUE_{i,t} \times DRIFTFACTORS_i] + \varepsilon''_{i,t+1} \quad (3)$$

	BHAR		*CARANN*	
	Pre-Conference Call Quarters	Post-Conference Call Quarters	Pre-Conference Call Quarters	Post-Conference Call Quarters
Variable	Parameter Estimate (t-statistic)	Parameter Estimate (t-statistic)	Parameter Estimate (t-statistic)	Parameter Estimate (t-statistic)
Intercept	−2.87 (−2.79)###	5.70 (−5.74)###	−2.33 (−7.81)###	−1.93 (−6.67)###
$DSUE_{i,t}$	6.25 (2.56)***	7.12 (2.75)***	7.09 (10.01)***	4.14 (5.51)***
$DSUE_{i,t} \times DRIFTFACTORS_i$	−4.35 (−1.33)*	−2.18 (−0.60)	−2.88 (−3.03)###	0.02 (0.02)
n	3,612		3,612	
Adj. R^2	0.56%		4.95%	

Calculation of Proportionate Drift where *DRIFTFACTORS* = 0:

	Pre-Conference Call Quarters		Post-Conference Call Quarters		
	Estimate	Chi-Square Statistic	Estimate	Chi-Square Statistic	Chi-Square Test of Difference
$c_1/(c_1 + f_1)$ for pre-conference call quarters $c'_1/(c'_1 + f'_1)$ for post-conference call quarters	46.85%	20.46***	63.23%	41.55***	1.31

***, **, * Significant at a p-value of less than 0.01, 0.05, and 0.10, respectively, using a one-tailed test.
###, ## Significant at a p-value of less than 0.01 and 0.05, respectively, using a two-tailed test.
See Tables 1 and 4 for variable definitions.

this question, I re-estimate Equations (1) and (2) using alternative dependent variables designed to capture the amount of analyst and investor underreaction that remains after the arrival of all information during the period leading up to the subsequent quarter's earnings announcement.

The alternative dependent variable used in Equation (1) is the forecast error based on the most recent analyst forecast prior to quarter *t*+1's earnings announcement. The prevailing forecast just prior to the subsequent earnings announcement incorporates analyst reaction to all information released during the period leading up to the subsequent quarter's earnings announcement. Therefore, estimating Equation (1) using this alternative dependent variable provides insight into whether conference calls add to the total amount of information about the persistence of previously announced earnings that analysts use during the quarter.

The alternative dependent variable used in Equation (2) is $CAR3_{i,t+1}$, which represents the cumulative abnormal return for the three-day period ending on quarter $t+1$'s earnings announcement. This alternative return metric captures the market's subsequent correction of any underreaction remaining after arrival of substantially all information during the period leading up to the subsequent quarter's earnings announcement. Hence, estimating Equation (2) using the alternative return metric provides insight into whether conference calls add to the total amount of information that investors use during the quarter about the persistence of previously announced earnings.[21]

In untabulated analyses, I find that, when the alternative forecast error metric is used to estimate Equation (1), the treatment firms continue to exhibit a decline in the serial correlation in analyst forecast errors surrounding conference call initiation. This finding indicates that conference calls add to the total amount of information that analysts use during the quarter about the persistence of previously announced earnings and is consistent with Bowen et al.'s (2002) contention that conference calls add to the total amount of available information about forthcoming earnings. By contrast, I find no evidence that conference calls are associated with a decline in post-earnings announcement drift for treatment firms when I re-estimate Equation (3) using the alternative return metric. Failure to find a reduction in drift for this shorter interval indicates that, while conference calls increase the timeliness of investor responses to earnings surprises, they are not associated with an increase in the total amount of information that investors use during the quarter about the persistence of previously announced earnings. The seemingly conflicting findings for analysts and investors from this set of tests may be due to a combination of factors including: (1) individual investors' limited access to conference calls during the sample period (which was prior to the passage of the Securities and Exchange Commission's Regulation Fair Disclosure) that may have impeded the complete incorporation of conference call information into prices even in the presence of active trading by institutional investors, (2) investors' potentially incomplete reaction to conference call information in cases where they did have access, and/or (3) investors' potentially incomplete incorporation of the conference call-related information embedded in analysts' forecasts.

V. CONCLUSION

Companies increasingly hold conference calls in conjunction with their earnings announcements. Prior studies show that conference calls induce heightened capital market reactions and help analysts form more accurate earnings expectations. However, aside from Tasker's (1998b) small-scale examination of conference call transcripts, prior work generally provides little insight into the nature of the information disclosed in conference calls. This study adds to our knowledge about the information content of conference calls by examining their effect on analysts' and investors' initial underreaction to current earnings surprises.

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[21] The use of alternative return intervals leading up to next quarter's earnings announcement is consistent with Soffer and Lys (1999). My use in this supplemental analysis of $CAR3_{i,t+1}$, which focuses on the portion of investors' underreaction to previously announced earnings that is resolved at the time of the subsequent quarter's earnings announcement, is based on the fact that conference calls are likely to be most informative about the relation between the current earnings surprise and next quarter's earnings (Bowen et al. 2002). However, for completeness, I also use as an alternative return metric ($CAR12_{i,t+1}$), which I calculate by accumulating abnormal announcement period returns for the first three subsequent quarters and subtracting the abnormal announcement period return for the fourth subsequent quarter. The calculation of $CAR12_{i,t+1}$ acknowledges the Bernard and Thomas (1990) finding that an earnings surprise is a positive (but declining) predictor of returns leading up to the three subsequent earnings announcements and a negative predictor of returns leading up to the fourth subsequent earnings announcement. Therefore, the use of $CAR12_{i,t+1}$, which was also used by Bartov et al. (2000), isolates the portion of the underreaction to previously announced earnings that is corrected at the time of the four subsequent quarterly earnings announcements. My results using $CAR12_{i,t+1}$ are consistent with those using $CAR3_{i,t+1}$.

I find that the initiation of conference calls is associated with a significant reduction in the serial correlation in analyst forecast errors, a measure of initial analyst underreaction. I also find that the initiation of conference calls is associated with a significant reduction in two measures of initial investor underreaction: (1) post-earnings announcement drift and (2) the *proportion* of the total market reaction to firms' earnings announcements that is "delayed" (i.e., that is attributable to post-earnings announcement drift). The reduction in post-earnings announcement drift surrounding conference call initiation is concentrated in the set of sample firms where drift is most severe (i.e., the smallest, least heavily traded sample firms) while the largest, most heavily traded sample firms do not exhibit significant drift either before or after conference call initiation. Robustness tests, including analyses of matched samples of nonconference call firms, indicate that the results are not driven by general increases in analyst and investor sophistication over time or by contemporaneous increases in the information and trading environments of conference call initiators.

Supplemental tests provide mixed evidence on whether, in addition to accelerating analyst and investor reaction to the future implications of current earnings surprises, conference calls increase the total amount of information used by market participants about the persistence of currently announced earnings. While conference calls appear to add to the total amount of information about the persistence of previously announced earnings that analysts consider, I find no evidence that conference calls are associated with an increase in the total amount of information that investors assimilate about the persistence of previously announced earnings. These seemingly conflicting findings may reflect investors' relatively less complete incorporation of conference call information, possibly because of their limited access to conference calls prior to the passage of the Securities and Exchange Commission's Regulation Fair Disclosure and/or because investors historically make less than optimal use of the information reflected in analyst forecasts. Overall, while I provide mixed evidence on whether conference calls increase the total amount of information about the persistence of currently announced earnings that analysts and investors use, I provide consistent evidence that conference calls result in more timely analyst and investor reactions to the future implications of currently announced earnings.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 221–241

How Do Investors Judge the Risk of Financial Items?

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ABSTRACT: This paper proposes and tests a risk model that explains how investors perceive financial risks. The model combines conventional decision-theory variables—probabilities and outcomes—with behavioral variables from psychology research by Slovic (1987), such as the extent to which a risky item is new, causes worry, and is controllable. To test our model, we conduct two studies in which M.B.A. students judge the risk of a broad range of financial items. Our results indicate that both the decision-theory variables and Slovic's (1987) behavioral variables are important in explaining investors' risk judgments. Further, we demonstrate that information about the amount of potential loss outcome contained within mandated risk disclosures not only directly influences risk judgments, but also indirectly affects such judgments via its effect on some of Slovic's (1987) behavioral variables. By identifying this unintended consequence of current risk disclosures, these results have the potential to influence the way accounting regulators, firm managers, and academic researchers think about risk disclosure.

Keywords: *risk perception; risk disclosure; decision theory; psychology.*

Data Availability: *Contact the authors.*

We appreciate the research assistance of Charlene Geisler and the helpful comments of Urton Anderson, Sarah Bonner, Eric Hirst, Pat Hopkins, Bill Kinney, Bob Libby, Steve Salterio, Dean Wichern, Susan Young, three anonymous reviewers, and workshop participants at the University of Alberta, Cornell University, Emory University, University of Florida, Indiana University, University of Notre Dame, University of Pittsburgh, and the 2001 American Accounting Association Annual Meeting. Funding for this project was provided by the Business Measurement and Assurance Services Center in the Department of Accounting at The University of Texas at Austin and Mays Business School at Texas A&M University.

Editor's note: This paper was accepted by Mark Nelson, Special Editor.

Submitted February 2004
Accepted June 2004

I. INTRODUCTION

Disclosure of information about risks and uncertainties has become an increasingly important part of financial reporting (Linsmeier and Pearson 1997), but there is little empirical evidence on how financial statement users assess risk. Indeed, it has been recently noted that "because most extant research focuses on effects of risk, not on how investors assess risk, the studies provide little explicit guidance about which disclosures can aid investors in assessing risk" (Schrand and Elliott 1998, 276). The purpose of this paper is to provide evidence on how financial statement users think about the risk of financial items and to determine how currently mandated risk disclosures affect risk perception.

Obtaining empirical evidence on this topic is of both theoretical and practical importance. From a theoretical perspective, the accounting literature on risk has primarily focused on the role of decision-theory variables—probabilities and outcomes—in risk perception (Libby and Fishburn 1977; Lipe 1998). However, psychologist Paul Slovic (1987) (hereafter Slovic) and his colleagues have amassed a significant body of descriptive evidence suggesting that risk perceptions are a function of two behavioral factors, which Slovic labels "dread" and "unknown." Prior studies generally have focused on *either* the decision-theory variables *or* Slovic's behavioral variables when examining people's risk perceptions. In this study, we propose that the two sets of variables are complementary and that both are necessary to fully explain investors' risk judgments. Further, we propose that the variables are causally related. Specifically, we predict that the decision-theory variables influence how individuals think about select behavioral variables. Jointly considering these decision-theory and behavioral variables provides theoretical insights into how investors think about the risks of financial items and accounting risk disclosures.

On a practical level, evidence about how financial statement users perceive risk is relevant to both managers and regulators. Research in other domains shows that people's risk perceptions directly influence their decision making (Coombs 1975; March and Shapira 1987; Weber 2004), so understanding how financial statement users perceive risk is a necessary prerequisite for understanding their reactions to risk disclosures (Fischhoff 1995). Indeed, without knowledge about how financial statement users think about risk, it is difficult for managers and regulators to discern whether risk disclosures are working as intended or whether current disclosures create unintended consequences (cf., Gomes et al. 2004). Thus, managers and regulators can use our evidence regarding the determinants of financial risk judgments to craft more effective disclosures. Our insights are especially timely given the recent push for improved risk disclosures (Mayo and Rutschow 2002).

We conducted two studies to test our model of perceived risk. In study 1, M.B.A. students with significant work experience and business training read qualitative descriptions of 19 financial items of varying degrees of risk. Participants rated the overall riskiness of each item as well as a number of variables considered in the Slovic and decision-theory risk models. Regression analysis of participants' responses reveals that the decision-theory and behavioral variables *both* directly influence investors' risk judgments, as hypothesized. Thus, a risk model that includes both decision-theory and behavioral variables has greater explanatory power than models with either set of variables alone. A factor analysis using participants' responses to the decision-theory and behavioral variables reinforces the idea that the behavioral variables capture different information, although the analysis does reveal some commonalities between the two sets of variables.

In study 2, we refined our model of risk perception to capture the idea that in addition to the direct effects of the decision-theory and behavioral variables on investors' risk perceptions demonstrated in study 1, the decision-theory variables also systematically affect the behavioral variables. That is, in study 2 we investigated the previously untested idea that certain decision-theory variables (in particular, the amount of potential loss) cause investors to make inferences about select behavioral variables, which, in turn, affect investors' risk perceptions. To test this model, we drew on insights from study 1 and changed the research design in two significant ways. First, we manipulated the amount of the potential loss (hereafter loss outcome). Manipulating loss outcome not only allowed us to test the robustness of our study 1 results, but also enabled us to test the validity of our causal risk model. Second, study 2 used more-detailed, quantified risk disclosures about each financial item. In study 1, participants read brief descriptions of each financial item with qualitative descriptions of how loss and gain outcomes could occur. Such abbreviated and qualitative descriptions are not unusual, as popular press articles, management conference calls, and brokerage reports often describe risks related to financial items with little contextual detail (e.g., Baker et al 2003; Buffett 2003; Fannie Mae 2003). However, several professional standards require detailed and quantitative risk disclosures for financial items (SFAS No. 106, FASB 1990; FRR No. 48, SEC 1997; SFAS No. 140, FASB 2000). To ensure that financial statement users assess risk similarly in these situations, study 2 participants read sensitivity risk disclosures with quantified loss outcome information similar to those mandated under professional standards.

The study 2 results strongly support our proposed model. Consistent with study 1, we find that both decision-theory and behavioral variables directly influence investors' risk judgments. Further, we observe that the quantified loss outcome information contained in sensitivity risk disclosures causes financial statement users to make systematic inferences about select behavioral variables, which in turn influences their risk judgments. From the evidence provided in our two studies, we conclude that investors' financial-risk perceptions are best described by a model that includes both decision-theory and behavioral variables. Our conclusions hold regardless of whether the risks are assessed in a relatively context-free environment (study 1) or in a more context-rich environment where decision-theory (i.e., loss outcome) information is provided in a precise, quantified form (study 2).

Our results contribute to the existing literature in several ways. First, our findings speak to the accounting and finance literatures that argue that risk is judged based on probabilities and outcomes. Specifically, we provide theoretical insights by outlining additional variables that financial statement users consider when judging risk, such as how much they worry about the risk, management's knowledge about the risk, and the extent to which the risk can be controlled. Of particular importance, we find that currently mandated disclosures that include information about potential loss outcomes cause investors to make inferences about other risk-related variables. This result suggests that current-risk disclosures may have consequences that were not intended by regulators and that communicating information about risk to financial-statement users is perhaps more complicated than initially thought. By identifying the complex roles of the decision-theory and behavioral variables in investors' risk perceptions, our research has the potential to influence the way accounting researchers, regulators, and managers think about risk disclosure.

Second, we provide important theoretical insights to the psychology literature on risk. Consistent with prior studies, we demonstrate that the decision-theory variables directly influence risk perceptions. However, we also show that the decision-theory variables *indirectly* affect risk perceptions via their effects on Slovic's behavioral variables. These insights have not been previously demonstrated in either psychology or accounting and suggest that risk perception is more complex than suggested by prior risk models. Thus, our study results, obtained using real-world financial risk disclosures, are important as both psychology and business scholars move forward in developing a more comprehensive theory of risk perception.

The paper is organized as follows. Section II describes the decision-theory and behavioral perspectives on risk. We also report the results of study 1, which examines the relative importance of decision-theory and behavioral variables in financial statement users' risk perceptions. Section III describes the results of study 2, which examines whether decision-theory variables have indirect as well as direct effects on investors' risk perceptions and replicates our study 1 findings in a context-rich setting. Section IV concludes and discusses implications of our results.

II. STUDY 1

Historically, there have been two dominant views on risk. The decision-theory view proposes that risk judgments are based on probabilities and potential outcomes. That is, when assessing risk, people are presumed to assess possible outcomes and the likelihood of those outcomes. Several empirical studies support this perspective (e.g., Weber 1988; Weber and Bottom 1989, 1990). Valuation models within accounting and finance also tend to take a decision-theory perspective, defining risk in terms of the variance of expected returns, cash flows, or earnings or the covariance of these measures with market factors (Froot et al. 1993; Jorgensen and Kirschenheiter 2003). Perhaps because of this, the decision-theory risk perspective is implicit in most risk-related accounting standards, which generally focus on disclosures of loss probabilities and/or loss outcomes (SFAS No. 5, FASB 1975; SFAS No. 106, FASB 1990; SOP No. 94-6, AICPA 1994; FRR No. 48, SEC 1997; SFAS No. 140, FASB 2000).[1]

From the behavioral risk perspective, people do not think about risk solely in terms of probabilities and outcomes. Based on substantial research in the health and technology domains, Slovic suggests that people perceive risk based on their assessments of two underlying dimensions, which he labels "dread" and "unknown." In Slovic's research, the dread dimension is comprised of variables that measure a risky item's perceived controllability and voluntariness, as well as the amount of worry and catastrophic potential associated with the item. The unknown dimension is comprised of variables that measure a risky item's observability, its newness, the amount of knowledge about the item, and the immediacy of the item's effects.

Although prior accounting studies rely on risk models that use decision-theory variables, we argue that risk models that incorporate both sets of variables will better explain investors' risk judgments. Many of Slovic's behavioral variables capture information that is different from the traditional decision-theory variables (Holtgrave and Weber 1993; Loewenstein et al. 2001). For example, Slovic's unknown dimension captures knowledge about a risky item (i.e., how well an item is understood) and its newness (i.e., whether the item is previously known). Both knowledge and newness differ from probability and outcome measures (e.g., a decision maker could have either low or high knowledge about a low-probability item, and the newness of an item is unrelated to its potential outcomes).

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[1] Although the decision-theory perspective can be statistical in nature (e.g., using calculated variance as a measure of risk), it also can be viewed in terms of perceptions, such as how people perceive probability data (e.g., Weber 1988) or react to variance (e.g., Lipe 1998). Our paper deals with how people *perceive* these decision-theory variables.

Thus, we expect Slovic's unknown dimension to capture information beyond traditional probabilities and outcomes.[2]

Slovic's dread dimension also includes several variables that are not fully captured by probability and outcome measures. For example, controllability captures whether actions can be taken to minimize a potential outcome, not the likelihood of a particular outcome or its magnitude. Worry also captures additional information, as both low- and high-probability events can cause significant worry. Thus, while some variables underlying the dread dimension may be correlated with decision-theory variables (e.g., high controllability may suggest low loss outcomes), we expect the variables underlying Slovic's dread dimension to capture additional features of investors' risk judgments.

One variable underlying Slovic's dread dimension, catastrophic potential, has greater overlap with traditional decision-theory variables. Specifically, catastrophic potential refers to the potential for extreme negative outcomes and thus overlaps with decision-theory loss outcome measures. Indeed, extreme negative outcomes have been incorporated into value-at-risk calculations that model worst-case losses (Linsmeier and Pearson 2000) and decision-theoretic financial risk models (see Libby and Fishburn [1977] for a review).

To determine whether the behavioral variables capture additional risk-relevant information, we estimate three regression models with risk as a dependent measure—one that includes only probability and outcome variables (hereafter decision-theory variables), one that includes the dread and unknown variables (hereafter behavioral variables), and a full model that includes both sets as independent variables. If our full-model adjusted R^2 is significantly greater than models containing either the decision-theory or behavioral variables alone, we would conclude that *both* the decision-theory and behavioral variables are risk-relevant (Kennedy 1998, 184; Byrne 2001). We also examine the statistical significance of the partial correlation coefficients in the full regression model, as doing so allows us to determine the incremental importance of the behavioral variables when the influence of the decision-theory variables is held constant, and *vice versa*. To determine the conceptual distinctiveness of the behavioral and decision-theory variables, we perform a factor analysis. If the behavioral and decision-theory variables capture different information, then we would expect multiple factors with some factors containing only behavioral variables and some containing only decision-theory variables.

Design and Procedures

Study 1 participants consisted of 40 M.B.A. students who averaged five years of work experience. Participants had taken an average of three finance and two accounting classes, and 95 percent had experience investing in common stocks. The study lasted approximately 30 minutes, and participants received $10 upon its completion.

The study required each participant to evaluate 19 financial items (see left column in Table 1). Because our methodology necessitated meaningful variation in these evaluations to ensure interpretable results (cf., Holtgrave and Weber 1993), we purposely chose items so that some were likely to be perceived as low risk (e.g., Cash), some as medium risk

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[2] It may be argued that Slovic's behavioral variables merely capture different aspects of decision-theory variables. For example, Slovic's unknown dimension may be related to ambiguity (i.e., second-order uncertainty). That is, the degree to which investors understand a particular risk likely affects their confidence in their probability estimates. However, even if some of Slovic's behavioral variables can be construed in terms of traditional decision-theoretic ideas, as long as the behavioral variables enhance our understanding of investors' risk judgments, then including both sets of variables in a descriptive risk model is better than either set alone.

TABLE 1
Means by Question and Financial Item: Study 1

Item \ Question	Loss Probability	Loss Outcome	Gain Probability	Gain Outcome	Status Quo Probability	Worry	Catastrophic	Voluntary	Newness	Immediacy	Control	Known by Participant	Known by Management	Risk
Accounts Receivable	43.6	31.0	25.4	17.9	44.9	32.3	27.7	84.7	9.4	66.5	61.3	48.0	69.1	36.9
Cash	41.5	20.1	31.5	21.0	49.1	20.2	14.7	83.7	8.0	60.7	63.2	66.3	77.3	23.0
Commodity Forward Contracts (Long Position)	41.1	34.2	44.5	37.6	33.6	41.3	35.3	69.8	26.1	68.6	55.1	34.5	52.2	48.6
Common Stock Investment	44.5	43.5	52.7	44.6	28.6	38.3	34.7	77.3	15.1	67.0	51.9	41.5	56.9	52.2
Currency Butterfly Spread (Long Position)	43.9	30.7	42.6	42.9	32.5	33.8	23.9	67.0	44.1	56.8	46.5	32.3	53.2	39.3
Defined-Benefit Pension Obligations	40.1	30.7	32.5	27.6	45.9	26.5	18.6	80.5	24.0	84.6	51.7	35.6	57.2	33.8
Employee Stock Options with Repricing Feature	43.8	36.4	44.0	31.1	36.8	36.1	23.7	65.9	43.4	64.0	50.4	25.3	50.8	40.8
Equity Call Options (Long Position)	44.5	30.6	47.1	45.0	27.8	36.2	24.6	72.7	28.4	64.2	51.2	40.6	57.8	43.3
Equity Call Options (Short Position)	50.7	50.1	50.5	38.8	28.7	53.8	40.6	58.8	34.6	60.3	47.1	34.4	48.6	61.0
Fixed-Rate European Currency Unit Bond Investment	48.5	38.2	43.4	32.7	36.1	43.9	32.3	62.3	44.9	66.6	44.6	30.5	45.5	47.8
Fixed-Rate Debt	40.1	28.8	41.5	28.0	41.1	24.9	20.4	78.5	12.4	76.3	59.9	53.4	69.6	32.0
Foreign Currency Futures (Long Position)	48.4	41.7	47.0	37.9	32.3	47.5	37.3	62.0	27.0	68.4	44.1	29.9	42.8	53.2
Foreign Currency Futures (Short Position)	50.0	41.6	47.6	40.5	32.4	50.9	35.7	64.5	32.7	52.7	42.2	28.2	40.3	57.0
Fixed-to-Variable Interest Rate Swap	43.2	33.6	46.1	31.5	35.6	41.9	30.3	69.0	30.5	70.5	50.9	37.2	56.6	47.0
Variable-to-Fixed Interest Rate Swap	44.0	29.9	44.6	28.2	35.5	37.7	23.1	71.2	28.3	73.5	50.3	34.5	56.0	37.9
OPPOSSM Put Options (Short Position)	47.1	42.5	48.0	36.5	33.6	44.3	32.1	64.4	43.7	63.1	47.5	30.2	54.0	51.3
Property, Plant, and Equipment	31.3	34.3	34.5	28.0	43.5	18.3	22.9	90.2	10.7	82.2	68.0	45.2	71.2	24.5
SPIN Indexed Note Investments	46.3	34.7	54.9	40.7	29.4	46.2	30.3	62.7	51.0	62.7	46.5	30.8	44.2	48.9
Variable-Rate Debt	44.9	33.1	45.0	31.9	33.7	40.6	30.5	73.3	22.3	70.5	52.8	38.1	52.3	44.9
Across all items	44.0	35.1	43.4	33.8	35.8	37.6	28.4	71.5	28.3	67.3	51.9	37.7	55.5	43.3

(*continued on next page*)

TABLE 1 (continued)

This table reports the means for the decision-theory and behavioral questions calculated by financial item.

The questions and their scale endpoints are as follows:

Loss Probability: What do you think is the probability of an economic loss to the company from the *financial item*? (0 = zero probability; 1.00 = certainty);
Loss Outcome: If there were an economic loss to the company from the *financial item*, how big a loss would you expect? (0 = zero loss; 100 = very large loss);
Gain Probability: What do you think is the probability of an economic gain to the company from the *financial item*? (0 = zero probability; 1.00 = certainty);
Gain Outcome: If there were an economic gain to the company from the *financial item*, how big a gain would you expect? (0 = zero gain; 100 = very large gain);
Status Quo Probability: What do you think is the probability of the status quo (neither an economic gain nor an economic loss) to the company from the *financial item*? (0 = zero probability; 1.00 = certainty);
Worry: Are the risks to the company from the *financial item* ones that cause you to worry or do they cause you no worry? (0 = no worry; 100 = high worry);
Catastrophic: To what extent are the risks to the company from the *financial item* likely to be catastrophic? (0 = not likely to catastrophic; 100 = likely to be catastrophic);
Voluntary: Would you voluntarily invest in a company that has *financial item* or would such an investment only occur if you were unaware of the *financial item* (involuntarily)? (0 = involuntarily; 100 = voluntarily);
Newness: Are the risks to the company from the *financial item* new, novel ones or old, familiar ones? (0 = old; 100 = new);
Immediacy: To what extent are the risks associated with the *financial item* immediate or are they likely to occur over time? (0 = immediate; 100 = over time);
Control: How difficult is it for the company's management to use their skill and diligence to control (limit) the risks of the *financial item*? (0 = very difficult to control; 100 = very easy to control);
Known by Participant: To what extent are the risks to the company from the *financial item* known precisely by you, as an investor? (0 = not known; 100 = known precisely);
Known by Management: To what extent are the risks to the company from the *financial item* known precisely by company management? (0 = not known; 100 = known precisely); and
Risk: Overall, how risky is the *financial item* to the company? (0 = no risk; 100 = high risk).

(e.g., Employee Stock Options), and some as high risk (e.g., Short Position in Equity Call Options).

We provided a definition of each item as well as a brief qualitative description of how a loss outcome and a gain outcome could occur.[3] Moreover, we asked participants to review a complete list of the items to be evaluated before making any individual judgments. Pilot-testing and an examination of participants' responses to the individual financial items indicated that this information allowed them to meaningfully distinguish among the items. That is, average assessments of the decision-theory and behavioral variables were appropriately low or high for the items being evaluated. For example, SPIN Indexed Note Investments and OPPOSUM Put Options were rated as more unknown than Cash and Property, Plant, and Equipment. Short Positions in Equity Call Options were judged to have greater loss probabilities and loss outcomes than Long Positions in Equity Call Options, and Variable-Rate Debt generated more worry than Fixed-Rate Debt. Thus, while we did not formally hypothesize differences in specific judgments across the 19 items, it appears that the items created meaningful response variation.

For each of the financial items, participants answered 14 questions. Eight questions measured the Slovic dimensions of dread and unknown. These questions asked participants to rate the following: (1) the extent to which they worried about the risks related to the item, (2) whether risks related to the item were likely to be catastrophic, (3) the degree to which management could control risks related to the item, (4) the extent to which the participant would voluntarily invest in a company with the financial item, (5) whether the risks related to the item were new or old, (6) the extent to which management understood the risks of the item, (7) the extent to which the participant understood the risks of the item, and (8) the degree to which item outcomes unfolded immediately or over time. Participants also assessed five decision-theory questions. Specifically, participants rated the expected magnitude of any economic losses or economic gains, and also rated the probabilities of an economic loss, an economic gain, and no change (i.e., status quo). The actual questions are shown in the legend of Table 1.

An additional question asked participants to rate the overall risk of the financial item. We did not provide study participants with a definition of risk, as doing so would have defeated our objective in determining how investors think about risk. After rating all 19 financial items, participants completed a post-experimental questionnaire that collected data on their coursework, investing experience, and work experience.

We undertook several procedures to ensure the validity of our results. First, we randomized the presentation of the 19 financial items so that participants did not evaluate the items in the same sequence. Second, to ensure that the order of the questions did not lead participants to justify their behavioral and decision-theory assessments with their risk judgments, we asked the behavioral questions either before or after the decision-theory questions, and asked the risk question either first or last in the sequence of all questions (i.e., four possible orders). None of the tests presented in the next section are systematically affected by question order. Third, we reversed the scale for four questions (i.e., voluntary, control, and the two knowledge questions). Thus, a logical response for any given item required the participant to respond high on the scale for some questions and low on the scale for others, precluding participants from merely responding in the same manner for all questions.

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[3] For example, for the item Fixed-Rate Debt, we explained that this item could cause an economic loss (gain) if interest rates decreased (increased), as the company would have to pay a rate higher than the prevailing interest rate (would not have to pay the higher prevailing interest rate). As another example, for the item Cash, we explained that it could cause an economic loss (gain) if inflation (deflation) occurred, as the same dollar would purchase fewer (more) goods and services.

Regression Results

Table 1 shows participants' mean judgments for the behavioral, decision-theory, and overall risk questions for the 19 financial items. We observe significant and meaningful variation in participants' mean responses. For example, overall risk judgments range from 23.0 for Cash (a low-risk item) to 61.0 for a Short Position in Equity Call Options (a higher risk item).

To determine how the decision-theory and behavioral variables relate to participants' risk judgments, we estimate three models using ordinary least squares regressions. Specifically, we compare the explanatory power of a model containing just the decision-theory variables (Model 1), a model containing just the behavioral variables (Model 2), and a model containing both sets of variables (Model 3). Because each participant rated all 19 items, we include an indicator variable for each participant to control for any non-independence among observations. This approach is consistent with empirical-archival methodology that estimates fixed-effects regressions with pooled (i.e., cross-sectional, time-series) data. We test for collinearity as suggested by Belsley et al. (1980) by examining the conditioning indices for our data matrix along with the variance inflation factors. These tests reveal moderate collinearity between the two knowledge questions. Consequently, we estimate all regressions with the Known by Management variable only; we obtain inferentially identical results if we instead include only the Known by Participant variable.

Panel A of Table 2 reports our regression results. Model 1 regresses perceived risk on the decision-theory variables. As expected, loss probability and loss outcome have significant positive coefficients, suggesting that greater loss outcomes and probabilities increase perceived risk. Moreover, the estimated coefficients on gain probability and gain outcomes are both positive, although the probability of gain measure is not statistically significant. A positive coefficient on gain outcome suggests that participants believed that greater gain potential leads to greater risk. Interestingly, the coefficients on both loss variables are significantly greater than those on their gain counterparts ($F > 7.5$, $p < 0.01$ for both). Thus, gains and losses both increase risk perceptions, but consistent with prior research (e.g., Weber 1988), risk increases more for a potential dollar lost than for a dollar gained.

Model 2 regresses perceived risk on Slovic's behavioral variables. Many of these variables are significant determinants of participants' risk perceptions. Consistent with prior research, we find significant positive relations between perceived risk and the worry and catastrophic potential variables and significant negative relations between perceived risk and the known, control, and voluntary variables. That is, participants perceive more risk when they worry more about an item or when the item has greater catastrophic potential. They perceive less risk when the item is more known by management and when the risk is more controllable and voluntary. The coefficients on the newness and immediacy variables are not statistically significant.

In Model 3, we regress perceived risk on both the decision-theory and behavioral variables, providing a critical test of the incremental importance of the two sets of variables. Nested F-tests reveal that Model 3 has significantly more explanatory power (adjusted for the number of variables in the model) than either Models 1 or 2 ($F > 15.0$, $p < 0.01$ for both), indicating that investors' risk judgments are better explained by considering both behavioral and decision-theory variables. Examining the specific regression coefficients, we find that the decision-theory variables that are significant in Model 1 (i.e., loss probability, loss outcome, and gain outcome) remain significant in Model 3. The behavioral variables that are significant in Model 2 (worry, catastrophic potential, known, control, and voluntary) also remain significant in Model 3. Because the regression coefficients are partial correlation coefficients, they measure the effect of each variable, holding constant all other variables in the model. The fact that both sets of variables remain significant in the full model suggests that both sets of variables have unique variation related to risk judgments.

TABLE 2
Fixed-Effects Ordinary Least Squares Regressions
Studies 1 and 2

Panel A: Study 1

Independent Variables	Model 1 Coefficients	Model 2 Coefficients	Model 3 Coefficients
Intercept	16.98*	44.70*	28.09*
Loss Probability	0.32*		0.15*
Loss Outcome	0.49*		0.19*
Gain Probability	0.04		0.03
Gain Outcome	0.10†		0.09*
Status Quo Probability	−0.05		−0.01
Worry		0.35*	0.31*
Catastrophic		0.33*	0.20*
Voluntary		−0.11*	−0.10*
Newness		−0.01	−0.03
Immediacy		0.01	0.03
Control		−0.09*	−0.07*
Known by Management		−0.12*	−0.12*
Adjusted R^2	54.8%	68.2%	71.5%
Panel B: Study 2			
Intercept	31.01*	56.80*	51.32*
Loss Probability	0.21*		0.07†
Loss Outcome	0.45*		0.12*
Gain Probability	−0.09†		−0.03
Gain Outcome	0.12†		0.09†
Status Quo Probability	−0.12*		−0.08†
Worry		0.27*	0.22*
Catastrophic		0.25*	0.18*
Voluntary		−0.20*	−0.17*
Newness		0.02	0.04
Immediacy		−0.02	−0.01
Control		−0.11*	−0.09*
Known by Management		−0.08*	−0.06†
Adjusted R^2	48.0%	63.2%	65.1%

(continued on next page)

TABLE 2 (continued)

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* $p < 0.01$, two-tailed.
† $p < 0.05$, two-tailed.
This table reports the results of the following three regression models:
Model 1:
$\text{Risk} = \alpha_1 + \beta_1$ (Loss Probability) $+ \beta_2$ (Loss Outcome) $+ \beta_3$ (Gain Probability) $+ \beta_4$ (Gain Outcome)
$+ \beta_5$ (Status Quo Probability) $+ \varepsilon_1$.
Model 2:
$\text{Risk} = \alpha_2 + \beta_6$ (Worry) $+ \beta_7$ (Catastrophic) $+ \beta_8$ (Voluntary) $+ \beta_9$ (Newness) $+ \beta_{10}$ (Immediacy)
$+ \beta_{11}$ (Control) $+ \beta_{12}$ (Known by Management) $+ \varepsilon_2$.
Model 3:
$\text{Risk} = \alpha_3 + \beta_{13}$ (Loss Probability) $+ \beta_{14}$ (Loss Outcome) $+ \beta_{15}$ (Gain Probability) $+ \beta_{16}$ (Gain Outcome)
$+ \beta_{17}$ (Status Quo Probability) $+ \beta_{18}$ (Worry) $+ \beta_{19}$ (Catastrophic) $+ \beta_{20}$ (Voluntary) $+ \beta_{21}$ (Newness)
$+ \beta_{22}$ (Immediacy) $+ \beta_{23}$ (Control) $+ \beta_{24}$ (Known by Management) $+ \varepsilon_3$.

The dependent measure for each regression is the perceived risk that participants assessed for each of the 19 (six) financial items used in study 1 (study 2). The independent variables are the participants' responses to Slovic's behavioral risk questions and the decision-theory risk questions for each of the financial items (see Table 1 for a description of the questions). We estimate all models with one-way fixed effects; included in each study 1 (study 2) regression are 39 (99) participant-specific indicator variables. We suppress these intercepts for presentation purposes.

Robustness Checks

To address the potential concern that Slovic's catastrophic question might be more aptly included with the decision-theory variables than with the behavioral variables, we re-estimated Model 1 with the catastrophic variable and re-estimated Model 2 without it. We find that the relative explanatory power and significant coefficients of the behavioral and decision-theory variables are inferentially identical to those presented in Table 2.

We also address the possibility that influential observations drive our results by removing outliers. We deleted the highest and lowest 5 percent of observations for each variable in turn and simultaneously deleted the highest and lowest 1 percent of observations for all the variables. The relative explanatory power of the behavioral and decision-theory variables is unchanged, suggesting that our results are not driven by extreme observations.

Factor Analysis Results

Our regression results indicate that both the behavioral and decision-theory variables are incrementally important in explaining investors' risk judgments. However, it might be argued that the two sets of variables measure the same underlying construct, but each does so imperfectly. We performed a factor analysis to determine whether the behavioral and decision-theory variables capture different constructs. Factor analysis finds the proportion of variance in each variable that is due to common factors (i.e., shared with other variables) and, thus, identifies a set of factors that characterize underlying constructs. Any unique variation in a variable is not captured by any factor.

Our factor analysis reveals four factors (see Panel A of Table 3). Factor 1 includes both decision-theory and behavioral variables: worry, catastrophic outcome, loss outcome, and gain outcome. The second and third factors include Slovic's behavioral variables only. Specifically, Factor 2 includes the Control, Known by Management, and Known by Participant variables, and Factor 3 includes Newness, Immediacy, and Voluntary. Factor 4 includes only decision-theory variables: the Loss, Gain, and Status Quo Probabilities. The fact that Factor 1 includes both behavioral and decision-theory variables suggests that these variables have common variation. However, our analysis also shows that some behavioral

TABLE 3
Factor Analyses
Studies 1 and 2

Panel A: Study 1

	Factor 1	Factor 2	Factor 3	Factor 4
Worry	**0.661**	−0.218	−0.442	−0.039
Catastrophic	**0.822**	−0.195	−0.223	−0.020
Voluntary	−0.309	0.250	**0.659**	0.085
Newness	0.257	−0.346	**−0.393**	−0.046
Immediacy	0.003	−0.004	**0.787**	−0.176
Control	−0.156	**0.702**	0.120	−0.199
Known by Management	−0.125	**0.871**	0.114	−0.094
Known by Participant	−0.116	**0.852**	0.065	−0.012
Probability of Loss	0.291	−0.083	−0.165	**0.397**
Loss Outcome	**0.857**	−0.137	−0.089	0.124
Probability of Gain	0.223	−0.083	0.144	**0.680**
Gain Outcome	**0.766**	−0.080	0.050	0.344
Probability of Status Quo	0.111	0.080	0.123	**−0.812**
Panel B: Study 2				
Worry	**0.798**	−0.216	−0.045	−0.162
Catastrophic	**0.772**	−0.130	0.129	−0.138
Voluntary	**−0.709**	0.303	0.106	0.064
Newness	**0.465**	−0.293	−0.054	0.327
Immediacy	**−0.289**	−0.038	−0.051	−0.051
Control	−0.326	**0.589**	0.101	−0.042
Known by Management	−0.035	**0.866**	0.003	0.088
Known by Participant	−0.092	**0.814**	−0.085	0.141
Probability of Loss	0.460	−0.041	−0.212	**−0.620**
Loss Outcome	**0.721**	−0.088	0.286	−0.282
Probability of Gain	−0.083	0.035	**0.864**	0.035
Gain outcome	0.288	−0.028	**0.857**	0.013
Probability of Status Quo	−0.012	0.158	−0.042	**0.832**

This table reports the factor patterns obtained from a principal component analysis with a varimax rotation, using participants' responses to the 13 behavioral and decision-theory questions. Panel A represents the study 1 results, while Panel B represents the results for study 2.
Bolded numbers indicate the largest factor loading for a particular question.
See Table 1 for a description of the behavioral and decision-theory questions.

and decision-theory variables provide distinct information—Factors 2 through 4 each include only one type of variable.

In sum, our study 1 results support our conjecture that the decision-theory and behavioral variables capture distinct information, although we also observe some commonalities. Further, we demonstrate that both sets of variables are important in explaining risk judgments. Financial risk judgments are influenced not only by probabilities and outcomes, but also by other factors such as how much individuals worry about the risk, the extent to which the risk can be controlled, and whether the risk is known to management. These results are significant, as they suggest that investors' risk judgments are more complex than suggested by prior accounting risk models.

III. STUDY 2

Study 2 extends study 1 in several important ways. First, study 2 examines the relative roles of the behavioral and decision-theory variables using more detailed risk disclosures. Low-detail, qualitative disclosures like those in study 1 are not uncommon; investors receive brief descriptions of financial items from sources such as popular press articles, conference calls, and brokerage reports (e.g., Baker et al. 2003; Buffett 2003; Fannie Mae 2003). However, mandated risk disclosures require a greater level of contextual detail, including quantified information about potential losses (SFAS No. 106, FASB 1990; FRR No. 48, SEC 1997; SFAS No. 140, FASB 2000). To ensure that our study 1 results generalize to these types of settings, we asked study 2 participants to judge the risk of financial items within the context of detailed, quantified risk disclosures similar to those currently mandated by professional standards.

Second, we manipulated a key decision-theory variable—potential loss outcome. Manipulating loss outcome allows us to examine the previously untested hypothesis that select decision-theory and behavioral variables are causally related. Our study 1 factor analysis indicates that certain decision-theory and behavioral variables are correlated. One possible reason that these variables load on the same factor is that they are causally related. In other words, the decision-theory variables may have *indirect* effects on risk judgments due to their effects on the behavioral variables in addition to the *direct* effects demonstrated in study 1. Thus, study 2 extends study 1 by testing for an *indirect* effect of loss outcome on investors' risk judgments. Demonstrating an indirect effect is important as it suggests that current risk disclosures that contain decision-theory information cause investors to make inferences that systematically influence their risk judgments above and beyond the direct effects induced by the information itself.

Psychology researchers have recently suggested that decision-theory variables may influence people's assessment of Slovic's behavioral variables (Lowenstein et al. 2001). However, little, if any, research has tested specific relations between these sets of variables. Based on the results of our study 1 factor analysis and prior research in the insurance domain, we hypothesize that loss outcome information may influence perceptions of dread. Kunreuther et al. (1978) find that individuals are more likely to purchase flood or earthquake insurance after experiencing a flood or earthquake. They argue that this effect occurs because potential losses are more vivid and thus more worrisome for people who have recently experienced such a loss. Drawing on this idea, we expect potential losses associated with a financial item to influence the dread associated with that item, and this increased dread, in turn, to influence overall risk judgments. In contrast, it seems unlikely that variations in potential loss outcomes will influence the variables underlying Slovic's unknown dimension. For example, variation in losses should not systematically affect the perceived degree of knowledge about an item. We therefore posit that information about potential loss outcomes will be positively related to variables underlying the dread dimension, but have no effect on variables underlying the unknown dimension.

Design and Procedures

Study 2 participants consisted of 100 M.B.A. students with demographics similar to those in study 1. The study lasted approximately 30 minutes, and participants received $10 upon its completion. Each participant evaluated the following six financial items: (1) Long Position in Commodity Futures, (2) Common Stock Investment, (3) Short Position in Equity

Call Options, (4) Fixed-Rate Debt, (5) Long Position in Foreign Currency Forward Contracts, and (6) Other Post-Retirement Health Benefit Liability.[4] Similar to study 1, we selected these items to vary in overall riskiness and randomized the presentation order of the items to minimize order effects. For each financial item, participants received a detailed risk disclosure developed from actual mandated risk disclosures found in 10-K reports. Specifically, each disclosure described the loss outcome consequences of a hypothetical 10 percent change in market rates, similar to the sensitivity disclosures mandated under FRR No. 48 and SFAS Nos. 106 and 140 (SEC 1997; FASB 1990, 2000). We varied the level of potential loss outcome at two levels on a between-subjects basis. Specifically, we informed participants in the low- (high-) loss outcome condition that a 10 percent change in market conditions would cause an economic loss to the company in the amount of approximately 1 percent (40 percent) of the company's equity. After reviewing each risk disclosure, participants answered the same set of risk questions used in study 1.

Results

Manipulation Checks

Two manipulation checks indicate that the loss outcome manipulation was successful. In the post-experimental questionnaire, we asked participants to assume that two otherwise identical companies reported the same market risk disclosures, with one company reporting a potential loss equaling 1 percent of equity, and the other reporting a potential loss equaling 40 percent of equity. For each company, participants indicated the materiality of each of the potential losses on a 101-point scale with 0 = Completely Immaterial and 100 = Completely Material. The mean materiality judgment is 33.11 for the low-loss outcome and 83.71 for the high-loss outcome, indicating a successful manipulation ($t = 15.51$, $p < 0.01$). As an additional check, we analyze participants' responses to the loss outcome question. Results show that the mean anticipated loss in the low-loss condition ($\mu = 35.8$) is significantly lower than the mean anticipated loss in the high-loss condition ($\mu = 43.9$) ($t = 3.02$, $p < 0.01$), providing further evidence that our manipulation was successful.

Replicating Study 1 with Real-World Risk Disclosures and Loss Manipulation

Before we test the idea that the decision-theory and behavioral variables are interrelated, we first examine whether our study 1 findings replicate with more-detailed, quantified risk disclosures. Specifically, we perform two sets of regression analyses similar to those in study 1—one with the *measured* behavioral and decision-theory variables as independent variables, and the other with the *manipulated* loss outcome variable in place of the measured loss outcome variable. We also perform a factor analysis to ascertain that the two sets of variables capture distinct constructs.

Panel B of Table 2 provides regression results for models using the measured loss outcome variable. Specifically, Model 1 regresses perceived risk on the decision-theory variables. Consistent with study 1, loss probability and loss and gain outcomes have significant positive coefficients, suggesting that greater outcomes and probabilities lead to greater perceived risk. Whereas the probability of gain and status quo measures were insignificant in study 1, the results for study 2 show significant negative coefficients for both variables. Thus, as the probability of a gain or status quo outcome increases, perceived risk decreases. Model 2 regresses perceived risk on the behavioral variables and also shows results similar to study 1. Model 3 regresses perceived risk on both sets of variables. All variables that were significant in Models 1 and 2 remain significant, with the exception of the gain probability variable. Nested F-tests reveal that Model 3 has significantly more explanatory power than either Model 1 or Model 2 (both Fs > 6.0, both p-values < 0.01). Thus, as in study 1, a model that includes both the behavioral and decision-theory variables best describes investors' risk perceptions.

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[4] Pilot-testing revealed that participants could reasonably evaluate only about six financial items when they were set within the context of detailed risk disclosures, so it was not possible to investigate as many items as in study 1.

Our second set of regressions uses the manipulated loss outcome variable (i.e., a binary variable that indicates the participants' loss condition) instead of the measured loss outcome variable. Our results are inferentially identical to those presented above. That is, the loss outcome manipulation is statistically significant in Model 1, suggesting higher potential loss outcome leads to greater perceived risk ($t = 2.69$, $p < 0.01$). More importantly, the behavioral variables continue to contribute significantly to the model's adjusted R^2 and Model 3 still provides the highest explanatory power. We also conduct robustness tests similar to those reported for study 1. Inferences about the relative explanatory power of the decision-theory and behavioral variables are the same under these robustness tests.

Panel B of Table 3 reports a factor analysis that includes all of the variables in study 2. Similar to study 1, four factors emerge from the analysis. Factor 1 includes the Worry, Catastrophic, Voluntary, Newness, Immediacy, and Loss Outcome variables. Factor 2 contains Control, Known by Management, and Known by Participant. Factor 3 includes Probability of Gain and Gain Outcome, while Factor 4 contains Loss Probability and Status Quo Probability.[5] Once again, Factor 1 includes both behavioral and decision-theory variables, indicating that these variables have some common variation. Factors 2 through 4 each include only one type of variable, suggesting that behavioral and decision-theory variables provide distinct information.

Testing the Interrelationship between the Decision-Theory and Behavioral Variables

We also designed study 2 to test our hypothesis that the decision-theory variables have indirect, as well as direct, effects on investors' risk judgments. We use structural equation modeling to test this hypothesis (Byrne 2001). Structural equation modeling has been used previously in accounting studies (e.g., Libby and Tan 1994; Towry 2003) and is a widely accepted method for simultaneously testing the direct and indirect effects of manipulated variables on a dependent measure.[6]

Panel A of Figure 1 depicts the structural equation model. To conclude that potential loss outcome has both direct and indirect effects on risk, we must observe two results. First, we must find significant links between manipulated loss outcome and the behavioral variables associated with dread (Link 2) and between dread and perceived risk (Link 3). Second, we must find that Link 1, the link from manipulated loss outcome to risk, remains significant once we introduce Links 2 and 3. If Link 1 becomes insignificant when Links 2 and 3 are included in the model, this would suggest that the behavioral variables associated with dread are substitute measures of loss outcome. That is, an insignificant Link 1

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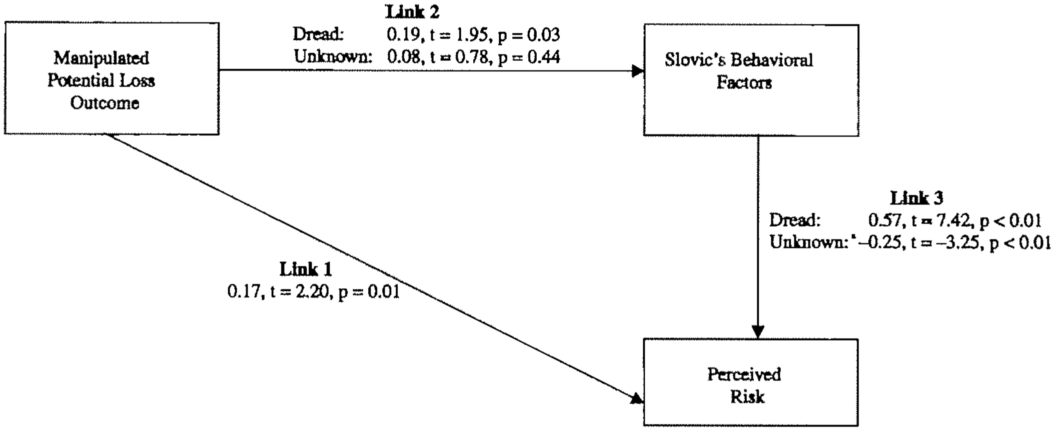
[5] Five variables—probability of gain, gain outcome, newness, voluntary, and immediacy—load differently in study 2 than in study 1. The movement of gain away from the first factor is perhaps not surprising as we did not cue participants with how a gain outcome could occur in study 2, while we described how both gain and loss outcomes could occur for each item in study 1. The movement of newness, voluntary, and immediacy (from factor 3 to factor 1) also is not surprising given their close association with the worry variable, which, in study 1, had a factor 3 loading of −0.442. Loadings with absolute values greater than 0.40 are normally considered significant (Hatcher 1994). If the data in study 1 are constrained to load on three factors, then the newness, voluntary, and immediacy variables load on the first factor, similar to the study 2 results.

[6] We use structural equation modeling instead of multivariate regression analysis with interaction terms, because the former allows us to measure the separate effects of loss outcome on Slovic's behavioral factors *and* the effect of those factors on risk. With a multivariate regression approach, those separate relations would be collapsed into interaction terms and we would lose valuable information about the separate relations.

FIGURE 1
Structural Equation and Factor Analyses
Study 2

Panel A: Structural Equation Analysis


Link 2
Dread: 0.19, t = 1.95, p = 0.03
Unknown: 0.08, t = 0.78, p = 0.44
Manipulated Potential Loss Outcome
Slovic's Behavioral Factors
Link 3
Dread: 0.57, t = 7.42, p < 0.01
Unknown:ª −0.25, t = −3.25, p < 0.01
Link 1
0.17, t = 2.20, p = 0.01
Perceived Risk

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[a] The negative coefficient on the unknown factor indicates that as the item is more known (i.e., less unknown), it is perceived as less risky.

This panel shows the results of the structural equation analysis to test the interrelationships between the decision-theory and behavioral variables in investors' risk perceptions. Shown next to each link are the standardized coefficients and corresponding t-statistics and p-values (all are one-tailed except for the Link 2 unknown link where no directional relation was expected).

Panel B: Factor Analysis with Behavioral Variables

	Factor 1	**Factor 2**
Worry	**0.832**	−0.212
Catastrophic	**0.780**	−0.143
Voluntary	**−0.763**	0.282
Newness	**0.494**	−0.208
Immediacy	**−0.303**	−0.059
Control	−0.301	**0.599**
Known by Management	−0.042	**0.873**
Known by Participant	−0.095	**0.828**

This panel reports the factor patterns obtained from a principal component analysis with a varimax rotation, using study 2 participants' responses to the eight behavioral questions. Bolded numbers indicate the largest factor loading for each question.

would show that loss outcome is related to dread but that any unique variation in loss outcome is not risk-relevant (i.e., is random). If, however, Link 1 retains its significance, then this finding would show that loss outcome is not only causally related to the dread variables, but also that it has its own unique variation that is causally related to risk judgments.

To parsimoniously conduct our tests, we first reduce the number of behavioral variables by conducting a factor analysis on participants' responses to the eight behavioral questions.[7] Panel B of Figure 1 shows that two factors emerge, largely consistent with Slovic. Specifically, our first factor, which we label dread, comprises Worry, Catastrophic, Voluntary, Immediacy, and Newness. The second factor contains the two known questions as well as the control question, and is designated as unknown.[8] We exclude decision-theory variables from this factor analysis to cleanly test the possible relation between loss outcome and the behavioral variables. In particular, we exclude the measured loss variable in the dread factor, as it would be tautological to regress the manipulated loss variable on a factor including that measured variable (i.e., it would essentially be a manipulation check). Including the measured loss variable in the dread factor also would cause the Link 3 relation between dread and risk to become redundant with the Link 1 relation between manipulated loss outcome and perceived risk.

Our structural equation analysis simultaneously estimates two models.[9] The first model, which is consistent with the decision-theory perspective, includes only Link 1. As one would expect, we find a strong positive coefficient for Link 1 in the first model, supporting the notion that as the potential loss amount increases, perceived risk increases ($t = 2.76$, $p < 0.01$). The second model includes Links 1, 2, and 3 and is shown in Panel A of Figure 1. If our hypothesis is correct (i.e., if loss outcome has indirect, as well as direct, effects on risk perceptions), this second model will fit the data significantly better than the first model and all three links will be significant.

Nested model comparisons show that, consistent with our predictions, the fit of the second model is significantly better than the fit of the first model ($\chi^2 = 48.39$, $p < 0.01$). The Comparative Fit Index for the second model shows a fit of .99, which is well above the accepted cutoff value of .95 (Byrne 2001). In contrast, the fit of the first model is only .88, which suggests an unacceptable fit.

Results for the specific links are also as expected. Link 1 is positive and significant ($t = 2.20$, $p = 0.01$), suggesting that as the potential loss amount increases so does perceived risk. Link 3 is significant for dread and unknown (both p-values < 0.01), indicating that items that create more dread result in greater perceived risk, as do those that are more unknown. Most important, Link 2 is highly significant for the dread dimension ($t = 1.95$, $p = 0.03$), but is not significant for the unknown dimension ($t = 0.78$, $p = 0.44$). As a robustness check, we also conduct our structural equation analyses without the catastrophic variable in the dread factor and obtain inferentially identical results.

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[7] It is not possible to conduct the structural equation modeling with all of the individual Slovic questions. Because the eight behavioral variables capture two constructs, there is high correlation among certain variables. Proper specification of the model would necessitate including parameters for the covariances among the variables, thereby leading to an under-identified model where the number of parameters to be estimated exceeds the number of variances and covariances (i.e., data points). Under-identified models lead to an infinite number of possible solutions (Byrne 2001, 35).

[8] The most important variables underlying the two factors, as evidenced by the size of the factor loadings, are identical between our study and Slovic's original work. However, a few variables load differently. Our factor analysis results appear to be reliable, though, as a factor analysis on the study 1 behavioral variables reveals results identical to those for study 2. Nevertheless, to ensure that these different factor loadings are the result of the different items being rated in our study versus Slovic's rather than the different type of study participant, we asked a separate group of 20 participants with the same demographics as our study participants to respond to the Slovic questions for a set of health and technological risks. A factor analysis reveals two dimensions that perfectly replicate those documented by Slovic with these stimuli. Thus, the observed differences in our study 2 factors appear to be due to the different items being rated rather than our study participants' education and training.

[9] It is not econometrically possible to incorporate the repeated measures nature of our study with existing structural equation software. Therefore, we average participants' responses to the six items and use one summary measure in our analyses. Conducting the structural equation modeling by ignoring the non-independence of our observations yields results that are qualitatively similar to those reported in the paper and do not change any of our inferences. Further, separate structural equation models for each of the six items reveals that a model that includes all three links shown in Figure 1 has significantly more explanatory power than a model with Link 1 only (all p-values < 0.01).

These results strongly support our conjecture that one decision-theory variable—potential loss outcome—directly affects risk judgments as well as indirectly affecting those judgments via its effect on dread. Indeed, these results provide evidence that while loss outcome and select behavioral variables are causally related, each has unique variation that is relevant to investors' risk judgments. If information about loss outcome captured exactly the same underlying information as the behavioral variables underlying the dread dimension, then it would not be econometrically possible for Links 1, 2, and 3 to be simultaneously significant in our structural equation analyses (Byrne 2001). Because all three links are simultaneously significant, we conclude that while loss outcome and dread have common variation, they each capture unique information regarding investors' risk judgments.

In sum, our study 2 results provide several insights into how individuals judge financial risks. First, the results suggest that existing risk models, which tend to focus on either the decision-theory or the behavioral variables, may not explain investors' risk judgments as well as a model that incorporates both sets of variables. Second, our results suggest that current accounting risk disclosures may have unintended consequences. Specifically, we show that risk disclosures that contain information about potential loss outcomes will have both *direct* effects on perceived risk and *indirect* effects on perceived risk via their influence on dread. Finally, by showing that measures that should be related to each other are, in fact, related to each other (i.e., that potential loss outcome influences perceived dread) and that measures that theoretically should not be related to each other are, in fact, not related to each other (i.e., that potential loss outcome does not influence perceived unknown), we provide evidence of both convergent and discriminant construct validity for the measures used in studies 1 and 2 (Trochim 2001).

IV. IMPLICATIONS AND CONCLUSIONS

This paper describes two studies that provide descriptive evidence on how financial statement users judge the risk of financial items. The results of these studies challenge the idea that risk perceptions can be described solely in terms of traditional decision-theory variables (i.e., probabilities and outcomes). By drawing on theoretical insights from the psychological literature, such as research by Slovic (1987), we identify and test additional variables that could potentially describe financial statement users' risk perceptions. We find that a risk model that incorporates these behavioral variables provides significant incremental explanatory power over a model containing only decision-theory variables. By documenting the significant role that these factors play in determining reactions to accounting risk disclosures, our study adds to existing accounting theories about how investors judge risk.

We also empirically document that these decision-theory and behavioral variables are not independent in their effects on perceived risk. In particular, we show that potential loss outcome has an indirect, as well as a direct, effect on risk perceptions. As one would expect, higher potential loss outcomes lead to greater perceived risk. Interestingly, though, we also find that potential loss outcome has an indirect effect on perceived risk via its influence on the behavioral dimension of dread. Specifically, higher potential loss outcome leads to greater dread, and greater dread, in turn, leads to greater perceived risk. As no prior studies empirically establish a causal relation between the decision-theory and behavioral risk variables, this result contributes not only to the accounting literature, but also to psychology theories of risk perception.

Our results also have practical implications. Regulators in other domains (e.g., nuclear power, AIDS, smoking) have found that it is often easier to tailor risk disclosures to users' understanding of risk than it is to re-train individuals to think differently about risk (Fischhoff et al. 1981; Fischhoff 1995). However, to take this approach, regulators must first understand the factors that people consider when judging risks. As Schrand and Elliott (1998) note, there is virtually no empirical evidence on how investors react to risk disclosures. This dearth of descriptive evidence makes it difficult for managers and regulators as they grapple with the best way to disclose risk-related information. Our results suggest that existing disclosure standards, which require disclosure of potential loss outcomes, may have an unintended consequence. That is, these disclosures may cause investors to make inferences about behavioral variables and these inferences independently influence investors' risk judgments. Regulators need to understand such unanticipated effects as they make decisions about new and existing risk standards.

Several limitations in our design provide opportunities for future research. First, additional study is needed to explore the role that Slovic's behavioral variables play in investor decision-making and market behavior. As our title indicates, the purpose of our study is to examine the variables that affect how investors judge the risk of financial items. Examining both judgments and decisions within the context of one study is difficult, as collecting one of these sets of variables can easily confound the other set. Because we are primarily interested in identifying the determinants, rather than the consequences, of investors' risk judgments, we focus on obtaining unbiased risk judgments and do not examine subsequent decisions or market behavior. Future studies could extend our findings by examining how and when the behavioral variables affect investors' financial decisions and market behaviors.

Additional study also will enhance our understanding of how the behavioral variables influence investors' interpretations of financial risk disclosures. In our study 2, we chose to manipulate a decision-theory variable and examine its impact on how investors perceive behavioral variables. An advantage of this approach is that it allowed us to understand how investors react to currently mandated accounting risk disclosures that tend to focus on decision-theory information. A limitation of our approach is that by eliciting both behavioral variable ratings and risk judgments, we may have observed artificially high correlations between the behavioral variables and overall risk judgments. Future research that manipulates, rather than measures, Slovic's behavioral variables would overcome this potential problem. For example, future research could investigate whether expanded disclosure of control policies and procedures, beyond the typical boilerplate discussions that currently exist, reduces perceived risk via its favorable effects on worry, management control, and knowledge.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 243–268

Investors' Evaluations of Strategic Prior-Period Benchmark Disclosures in Earnings Announcements

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ABSTRACT: Schrand and Walther's (2000) archival evidence suggests that managers strategically disclose prior-period benchmarks in current earnings announcements, which, in turn, influences investors' judgments. Using a controlled experimental setting, I present evidence confirming that a transparent description of a transitory prior-period gain or loss affects how investors apply prior-period earnings when evaluating current-period earnings. I also provide evidence that this effect is likely to be unintentional on the part of investors, resulting from limitations in their memory for the prior-period event. Overall, the experimental results suggest that a quantitative description of the transitory prior-period gain or loss in a current earnings announcement helps investors to evaluate company performance. The results also highlight the need for consistency in reporting non-GAAP financial performance measures.

Keywords: *performance benchmarks; reference points; discretionary disclosures; pro forma earnings; consistency.*

Data Availability: *Contact the author.*

I. INTRODUCTION

Archival research has documented managers' tendencies to report benchmarks that suggest favorable relative current performance. Benchmark disclosures are time-series or peer-group references presented in statements of performance. The current

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This paper is based on my doctoral dissertation at Cornell University. I especially thank Bob Libby and Mark Nelson (my dissertation committee co-chairs) for their advice, support, and encouragement; Beverly Walther for early discussions related to this research; and faculty from Cornell University's Johnson Graduate School of Management and the University of Waterloo's School of Accountancy for their support in recruiting participants. I appreciate comments provided by Tom Gilovich and Marty Wells (my committee members), Wendy Bailey, Rob Bloomfield, Susan Curtis, Annie Farrell, Eric Hirst, Ananda Ganguly, Jeffrey Hales, Pat Hopkins, Karim Jamal, Lisa Koonce, Charles Lee, Bernardine Low, Mark Peecher, Steve Salterio, two anonymous reviewers, and workshop participants at Cornell University, Emory University, Michigan State University, University of Alberta, University of Illinois at Urbana–Champaign, The University of Texas at Austin, and University of Waterloo. I also gratefully acknowledge financial support from Cornell University's Johnson Graduate School of Management, the Institute of Chartered Accountants of Ontario, the American Accounting Association, and the Deloitte & Touche Foundation.

This paper was awarded the AAA Competitive Manuscript Award in 2002.

Editor's note: This paper was accepted by Steven Kachelmeier, Special Editor.

Submitted November 2001
Accepted May 2004

study uses experimentation to investigate whether and why managers' benchmark disclosures influence investors' evaluations of company performance. Specifically, I test alternative explanations for recent archival evidence that managers' strategic disclosures of prior-period events in current earnings announcements influence investors' judgments (Schrand and Walther 2000). My experiment complements and extends the existing archival research by replicating key results in a controlled setting, distinguishing between alternative explanations for these results, and providing *ex ante* evidence on disclosures that could assist investors in their evaluations.

Schrand and Walther (2000) document a bias in the prior-period information included in earnings announcements that can lead to systematic errors in investor evaluations of company performance. Companies generally include a comparative statement of prior-period earnings in their current earnings announcements, thus providing a benchmark that investors can use to evaluate current earnings. Schrand and Walther (2000) find that companies whose prior period includes a nonrecurring gain on the disposal of property, plant, and equipment ("transitory prior-period gain") remind investors of this event more often than companies whose prior period includes a similar loss ("transitory prior-period loss"). As a result, investors may evaluate current performance against a lower reference point, increasing relative earnings growth, and improving perceptions of company performance. If the prior-period event were truly nonrecurring, this tendency to remind investors about prior-period gains would arguably lead investors to more appropriate evaluations of company performance. However, because managers normally avoid any reminders of prior-period losses, investors could make overly optimistic evaluations of companies with transitory prior-period losses.

I recreate important elements of Schrand and Walther (2000) in a controlled experimental setting, manipulating key features of the prior-period information included in the current earnings announcement to differentiate between potential causes. Several of the alternate explanations I investigate would suggest that investors are acting reasonably. Thus, the source of the influence on investor evaluations would determine not only what type of decision-aid or regulatory intervention might be needed to assist investors (Kennedy 1993; Bonner et al. 1996), but also whether any attempt at intervention is warranted. I use the comparative advantages of experimentation (Kachelmeier and King 2002; Libby et al. 2002) to examine how important features of this disclosure setting influence investors' judgments and to provide *ex ante* evidence on disclosures that could assist investors in their evaluations.

In the experiment, M.B.A.- and accounting-student investors interpret a company's earnings announcement and forecast the next period's earnings. Investors first receive a prior-period announcement that fully discloses the results of a property disposal, manipulated between subjects to be either a gain or a loss. After a distracter task, investors receive the current-period announcement. I manipulate, between subjects, whether a clear, quantitative description of the prior-period event is present in the current announcement, and whether the comparative prior-period earnings stated in the current announcement adjusts for the event. I further manipulate, within subjects, whether investors have access to the prior-period announcement to develop their forecasts. Initially, investors cannot return to the prior-period announcement. However, after reporting their initial earnings forecasts, investors receive a duplicate copy of the prior- and current-period announcements and are again asked to forecast earnings.

Four elements of the experimental design provide incremental insights into the archival results documented by Schrand and Walther (2000). First, by using the same company and financial data but varying the prior-period information that is repeated in the current earnings announcement, I can test whether differences in disclosures are sufficient to lead to Schrand and Walther's (2000) results. In practice, companies choose whether and how to remind investors about prior-period events. Given this self-selection and the small size of the Schrand and Walther (2000) sample, it is possible that uncontrolled differences between companies, rather than differences in the repetition of prior-period information in current announcements, led to their observed differential investor reactions.

Second, by varying whether the prior-period event describes a transitory gain or a transitory loss, I can distinguish between two feasible explanations for Schrand and Walther's (2000) results. The companies in Schrand and Walther's (2000) sample that remind investors of prior-period events do so primarily for prior-period gains. Consequently, their results are consistent with two alternate explanations: (1) investors reward managers who repeat relevant prior-period information, or (2) investors adjust for the transitory prior-period gain and calculate a lower prior-period benchmark that makes current-period earnings appear more impressive. I examine reactions to both the prior-period events that managers normally choose to mention in their current-period earnings announcements (prior-period gains) and those that managers normally avoid (prior-period losses, which, if excluded, produce a higher prior-period benchmark that makes current-period earnings appear less impressive). Results indicating that there is no difference between investors' responses to repeated prior-period gain and prior-period loss information would support interpretation (1); results indicating that investors respond less favorably to reminders of a prior-period loss would support interpretation (2).

Third, by varying components of the prior-period information that are repeated in the current-period earnings announcement, I can examine whether two specific cognitive limitations affect investors' consideration of the prior-period event. Specifically, I vary, between subjects, whether the current-period earnings announcement includes a clear, quantitative description of the prior-period event, and whether the comparative prior-period earnings number that is stated in the current announcement is adjusted to remove the effects of the prior-period event. If investors are more likely to consider prior-period information when the current announcement includes a clear description of the event, then this would imply limitations in investors' ability to remember the prior-period information. Conversely, if investors are even more likely to consider prior-period information when the prior-period earnings are adjusted for the event, then this would imply investors experience difficulty in adjusting prior-period earnings to remove prior-period transitory items.

Fourth, a within-subject manipulation in this design allows me to examine whether investors change their estimates once they are allowed to re-examine the prior-period announcement. Schrand and Walther (2000) suggest that managers could be signaling their private information about the (lack of) persistence of the prior-period event by reminding investors about the event in the current earnings announcement. If investors perceive the form of the reminder as a signal about persistence, then they should not change their forecasts after re-examining the prior-period information, because the form of the current-period reminder remains unchanged. On the other hand, if investors are initially unaware of the influence that the selective repetition of prior-period information has on their evaluations, they can self-correct their forecasts after re-examining the prior-period announcement (Kahneman and Tversky 1996; Tan et al. 2002).

Consistent with Schrand and Walther (2000), results indicate that managers' selective repetition of information about transitory prior-period events in current earnings announcements affects investors' adjustments for the events and, in turn, their evaluations of earnings performance. I find that investors adjust for the prior-period event when a clear, quantitative description is present in the current-period announcement, but not when the description is absent, even though investors had previously identified the event. The resulting differences in investor forecasts are reduced when investors re-examine the prior-period announcement, suggesting that a component of the initial differences in investor evaluations is unintentional, due to limitations in investors' memory for the prior-period event. I do not find any significant evidence that investor forecasts differ intentionally due to beliefs about persistence.

I do not find a significant incremental effect of adjusting the comparative prior-period earnings stated as a benchmark in the current-period announcement when a clear description of the prior-period gain or loss is already in the announcement. However, supplemental data suggest that there would be an incremental effect of adjusting the stated earnings benchmark if managers obscure the description of the prior-period event. Thus, mandating both the provision and the location of such descriptions would be necessary to help investors avoid overly optimistic evaluations of prior-period loss companies. These results help to explain the rarity of disclosures for transitory prior-period losses in earnings announcements. Such disclosures would indeed be expected to lower investor evaluations of current performance.

The implications of my experiment bear upon the SEC's (2003a) guidelines for pro forma earnings. Companies that choose to disclose pro forma earnings are now required to reconcile pro forma earnings with earnings as defined under Generally Accepted Accounting Principles (GAAP). However, if a company has experienced a transitory prior-period loss, a manager may avoid any reminder about the prior-period loss in the current-period announcement and present only a GAAP earnings benchmark. As such, no reconciliation or reference to the prior-period loss would likely be required in the current-period announcement. While extant research suggests that managers have incentives to increase current pro forma earnings by eliminating transitory losses from their current income (Bhattacharya et al. 2004), my results suggest that managers do *not* have incentives to remind investors about such losses in the following period, leading to overly optimistic evaluations of performance. These results highlight the need for comparability and consistency (FASB 1980) in the reporting of non-GAAP financial performance measures.

The remainder of the paper proceeds as follows. Section II develops the hypotheses. Sections III and IV describe the experimental method and results, respectively. Section V provides a discussion of the results, implications, and limitations of this research.

II. BACKGROUND AND HYPOTHESES

Companies generally present prior-period earnings in current-period earnings announcements to assist investors in evaluating company performance.[1] Schrand and Walther (2000) (hereafter Schrand and Walther) document that companies whose prior-period results include a nonrecurring gain on the disposal of property, plant, and equipment choose to remind investors of this event more often than do companies whose prior-period results include a similar loss. Schrand and Walther suggest that this tendency occurs because reminding investors of the prior-period disposal encourages investors to compare current earnings to a benchmark that removes the transitory effect of the gain or loss from prior-period earnings (i.e., prior-period "adjusted earnings").[2]

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[1] The National Investor Relations Institute (NIRI 2002) recommends that earnings announcements include a complete income statement and balance sheet, but earnings announcements often list only key items (such as revenues, earnings, and earnings per share). For example, the New York Stock Exchange (NYSE 1995) requires only minimal disclosure of current results—net income, the amount of federal taxes, and any substantial items of an unusual or nonrecurrent nature (¶203.02(C)). The NYSE also recommends that "each interim statement include like figures of the same period of the previous year, to afford a basis for comparison" (¶203.02(C)).

Schrand and Walther's interpretation is consistent with numerous findings in psychological research. Benchmarks have been called comparison levels (Thibaut and Kelley 1959), adaptation levels (Helson 1964), reference points (Kahneman and Tversky 1979; see also Tversky [1972] on reference-dependence in choice), and norms (Kahneman and Miller 1986). In general, "the evaluation of a stimulus depends not only on the characteristics of the stimulus itself, but also on the referent or standard that is brought to bear in the evaluation process" (Boles and Messick 1995, 262).

If adjusted earnings serve as a reference point for investors, then the valuation implications depend on whether the prior-period disposal resulted in a gain or loss. Eliminating a gain would lower adjusted earnings. As a result, investors who evaluate current performance against this lower reference point would perceive the company as performing better than if prior-period earnings had not been adjusted. For prior-period losses, the opposite holds: eliminating a loss would raise adjusted earnings. As a result, investors evaluating current performance against this higher reference point would judge the company as performing worse than if prior-period earnings had not been adjusted. Not surprisingly, companies remind investors of prior-period gains more often than prior-period losses (Schrand and Walther 2000).

My experiment complements and extends Schrand and Walther's archival research by replicating key results in a controlled setting, distinguishing between alternative explanations for these results, and providing *ex ante* evidence on disclosures that could assist investors in their evaluations. Below, I discuss each of the alternate explanations for the apparent influence of this disclosure bias on investors' judgments.

Economic Explanations for Differential Investor Reactions

I first consider whether benchmark disclosures are sufficient to lead to Schrand and Walther's results. In practice, companies choose whether to remind investors about prior events. Given the small size of Schrand and Walther's sample (103 observations), uncontrolled systematic differences between companies may have led to the differences in investor reactions that they observe. By holding constant company and financial data across experimental conditions, I can mitigate the possibility that a correlated omitted variable accounts for Schrand and Walther's results.

I also examine whether Schrand and Walther's results can be attributed to investors merely rewarding managers' willingness to repeat relevant prior-period information in their current disclosures. Because prior-period loss disclosures are rare in practice (constituting only 5.9 percent of the loss companies in the Schrand and Walther sample), the archival evidence is based primarily on companies that disclose prior-period gains. As a result, Schrand and Walther's findings are consistent with two alternate explanations: (1) investors reward managers who repeat relevant prior-period information, leading to more favorable evaluations, or (2) investors adjust for the transitory prior-period gain and adopt a lower reference point, again leading to more favorable evaluations of performance. I do not directly test whether investors reward managers who are willing to repeat relevant prior information. Instead, I focus on addressing the question of whether investors adopt different reference points. Specifically, I investigate both prior-period gains and prior-period losses to provide evidence on what would happen if investors had been reminded about prior-period losses, thereby testing whether investors adopt different reference points. If investors merely reward companies that repeat relevant prior-period information, then no difference in investors' evaluations of company performance should be observed with the reminder of prior-period gains versus losses. In contrast, if investors adjust for a prior-period loss, they should adopt a higher reference point, leading to less favorable evaluations of company performance.

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[2] Companies in Schrand and Walther's (2000) sample labeled adjusted earnings in a variety of ways, including "net earnings excluding the effect of the disposal," "operating income excluding the effects of the disposal," and simply "operating income."

H1a: Investors will evaluate a company's performance *more* favorably when information about a transitory prior-period *gain* is provided in the current-period announcement.

H1b: Investors will evaluate a company's performance *less* favorably when information about a transitory prior-period *loss* is provided in the current-period announcement.

Cognitive Mechanisms for Differential Investor Evaluations

To the extent that the archival results are confirmed, alternate psychological factors can contribute to the differences in investors' evaluations. Identifying the underlying cognitive mechanisms would help to identify the type of decision-aid or regulatory disclosure requirement that would assist investors (Kennedy 1993; Bonner et al. 1996; Libby et al. 2002).

Availability

Prior-period earnings are generally disclosed in the current earnings announcement, but the provision of additional information about the prior-period gain or loss is left to the discretion of management. Without any mention of the prior-period event in the current announcement, investors must recall the details of the transitory gain or loss from long-term memory in order to adjust earnings. The necessary integration occurs only if both the prior-period earnings and the transitory gain or loss are simultaneously available in working memory (Moeckel 1990). However, prior research suggests that even auditors, who are professionals charged with identifying the inconsistencies in a set of financial information they are reviewing, can rely on their own potentially inaccurate or incomplete memory of the facts (Moeckel and Plumlee 1989).

A clear, quantitative description of the prior-period gain or loss in the current earnings announcement would ensure that investors had sufficient information available about the gain or loss to compute adjusted earnings. Providing this memory prompt would therefore likely lead investors to adjust earnings. Without the memory prompt, investors must first recall the details of the event before they can adjust earnings, and they may be unable to do so. This suggests that investors will adjust earnings more often when a clear, quantitative description of the transitory prior-period gain or loss eliminates the need to recall the event from long-term memory.

H2a: Investors will evaluate a company *more* favorably when a clear, quantitative description of a transitory prior-period *gain* is included in the current-period announcement.

H2b: Investors will evaluate a company *less* favorably when a clear, quantitative description of a transitory prior-period *loss* is included in the current-period announcement.

Integration

Although the availability of the prior-period gain or loss in working memory may be a necessary condition, it may not be sufficient to affect investors' judgments. Decision makers who are unable or unwilling to exert the cognitive effort required to integrate the available information would use information only as it is explicitly presented (Dietrich et al. 2001). This form of bounded rationality argues that "any information that has to be stored in memory, inferred from the display, or transformed will be discounted or ignored" (Payne et al. 1993, 48).

Thus, the degree to which the description of the prior-period gain or loss is integrated into the disclosure can influence investors' adjustments for the prior-period event.[3] With a clear, quantitative description of the nonrecurring prior-period event, investors could use either prior-period earnings or adjusted earnings as a reference point, regardless of which of the two is explicitly stated. However, it is easier for investors to use adjusted earnings as a reference point when that number is provided explicitly than when investors need to calculate it by combining the description with the prior-period (unadjusted) earnings.

H3a: Investors will evaluate a company with a transitory prior-period *gain more* favorably when adjusted earnings are explicitly stated as the performance benchmark in the current-period announcement, even when a clear, quantitative description of the gain is present.

H3b: Investors will evaluate a company with a transitory prior-period *loss less* favorably when adjusted earnings are explicitly stated as the performance benchmark in the current-period announcement, even when a clear, quantitative description of the loss is present.

Inferences and Corrections

An alternate explanation for differences in investors' evaluations is that investors actively decide whether to adjust for the prior-period event based on inferences made from the form of the disclosure. For example, Kennedy et al. (1998) show that investors infer different underlying distributions from alternate forms of contingent environmental liability disclosures. Similarly, the form of a reminder could affect investors' inferences about the persistence of a prior-period event. Schrand and Walther suggest the possibility that managers remind investors of the prior-period event in order to signal the transitory nature of the gain or loss. Although Schrand and Walther (2000, 168) did not find significant evidence that gains and losses differed in their persistence, their evidence does not address investors' beliefs. Investors could still perceive the repetition of prior-period information as a signal about persistence, leading to intentional adjustments of beliefs regarding the appropriate reference point.[4]

Such intentional differences are not likely to be affected by investors' re-examination of the prior-period earnings announcement, as long as the form of the reminder in the current announcement remains unchanged. However, if the differences in investor evaluations are not intentional, knowledgeable investors should be able to self-correct their evaluations when given the opportunity to re-examine the prior-period earnings announcement (Kahneman and Tversky 1996; Tan et al. 2002; Libby et al. 2002).

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[3] Similarly, recent research on comprehensive income disclosures (Hirst and Hopkins 1998; Maines and McDaniel 2000), intangibles (Luft and Shields 2001), and the accuracy of prior estimates (Hirst et al. 2003) has also documented that presentation format can affect analysts' and individual investors' evaluations of performance. See Boldt (2001) for a review of research on functional fixation, and Kleinmuntz and Schkade (1993) on information displays.

[4] Likewise, recent research in consumer choice suggests that concurrent disclosures in advertising can correct invalid inferences about brand quality (Johar and Simmons 2000).

> **H4:** After re-examining the prior-period earnings announcement, investors will revise their evaluations to reduce the initial effects of differences in the information about the transitory prior-period gain or loss that is repeated in the current-period announcement.

Investors' re-examination of the prior-period earnings announcement also addresses whether investors can correct their evaluations based solely on a review of previously known information. Schrand and Walther find some evidence of stock price correction at the release of the full financial report (10-Q or 10-K). Companies whose earnings announcements did not originally remind investors of the transitory prior-period gain experience additional stock price increases that are consistent with investors revising their evaluations to exclude the gain from prior-period earnings. An alternative explanation suggested by Schrand and Walther is that the financial statements contain other new information aside from the components of prior-period earnings to which investors are reacting.[5] This experiment allows me to restrict information to only those cues that are provided previously. This ensures that any revisions in investor evaluations are due solely to "reminders" about prior-period earnings and are not due to differences between investors or to new information.

III. METHOD

Design

Dependent Variable

In my experiment, investors interpret a company's current earnings announcement and forecast the next year's earnings. I use forecasts of future earnings as my measure of investors' evaluations of performance because future earnings and future earnings growth are important components of value determinations (Feltham and Ohlson 1995; Ohlson 1995; Lee 1999; Ohlson and Juettner-Nauroth 2000).

Independent Variables

My experiment uses a 2 × 3 × 2 mixed design. Investors first receive a prior-year announcement that fully discloses a property disposal, manipulated between subjects to be either a *gain* or *loss*. After a distracter task, investors receive the current-year announcement, manipulated between subjects to repeat prior-period information at three levels: *earnings*, *earnings plus description*, or *adjusted earnings plus description*.[6] Within subjects, I manipulate whether investors have access to the prior-year announcement when developing their forecasts. At first, investors are prevented from returning to the prior announcement. However, after reporting their initial earnings forecasts, investors are provided with a duplicate copy of the prior and current announcements, and are then asked to forecast earnings again for the next year.

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[5] Schrand and Walther (2000) cannot assess this alternate explanation due to the prevalence of fourth-quarter events in their sample. The modal financial statement release they investigate is that of the annual Form 10-K (which typically contains more information than the quarterly Form 10-Q). Three-quarters (75 percent) of Schrand and Walther's (2000) sample occur in the fourth quarter, with a higher proportion of fourth-quarter events for prior-period losses (88 percent) than for prior-period gains (67 percent).

[6] The three levels of prior-period information comprise an incomplete factorial design, crossing the presence of a description of the prior-period event with the comparative prior-period earnings number that is explicitly stated in the current announcement. This incomplete factorial design allows me to test for an effect of availability and an *incremental* effect of integration. It is not possible to fully cross this design because it is not possible to create materials for an integrated, adjusted earnings treatment without also affecting availability. If the adjusted earnings benchmark is clearly labeled, then the label itself would provide a memory prompt and would affect the availability of the prior-period event in working memory. If the adjusted earnings benchmark is not clearly labeled, then the interpretation of that number could differ across conditions.

Materials and Procedures

Each investor was provided with a package containing written instructions, a participation consent form, and the case materials. All investors had access to a calculator. There were five parts to the case materials (Figure 1), and each part of the experiment was provided in a separate envelope. All investors returned the related materials to the corresponding envelopes before continuing to the next part of the experiment.

The case materials maintain the structure of the real prior-period-loss example cited by Schrand and Walther (2000, Note 1; see also *PR Newswire* 1990, 1991). This company's prior-period loss was large relative to current-period earnings, so that the company would report a large increase in earnings compared to prior-period earnings, but a small decrease in earnings compared to prior-period *adjusted* earnings. To create the prior-period-loss announcements used in the experiment, I adapted the company's earnings announcement as follows: (1) to simplify the information required, the case materials present annual (not quarterly) disclosures; (2) to clarify the effect of the prior-period event, the prior-period loss is stated on an after-tax basis and is presented in a tabular format in the prior-period announcement; and (3) the number of shares outstanding is held constant, such that changes in per-share earnings are proportional to changes in total earnings.

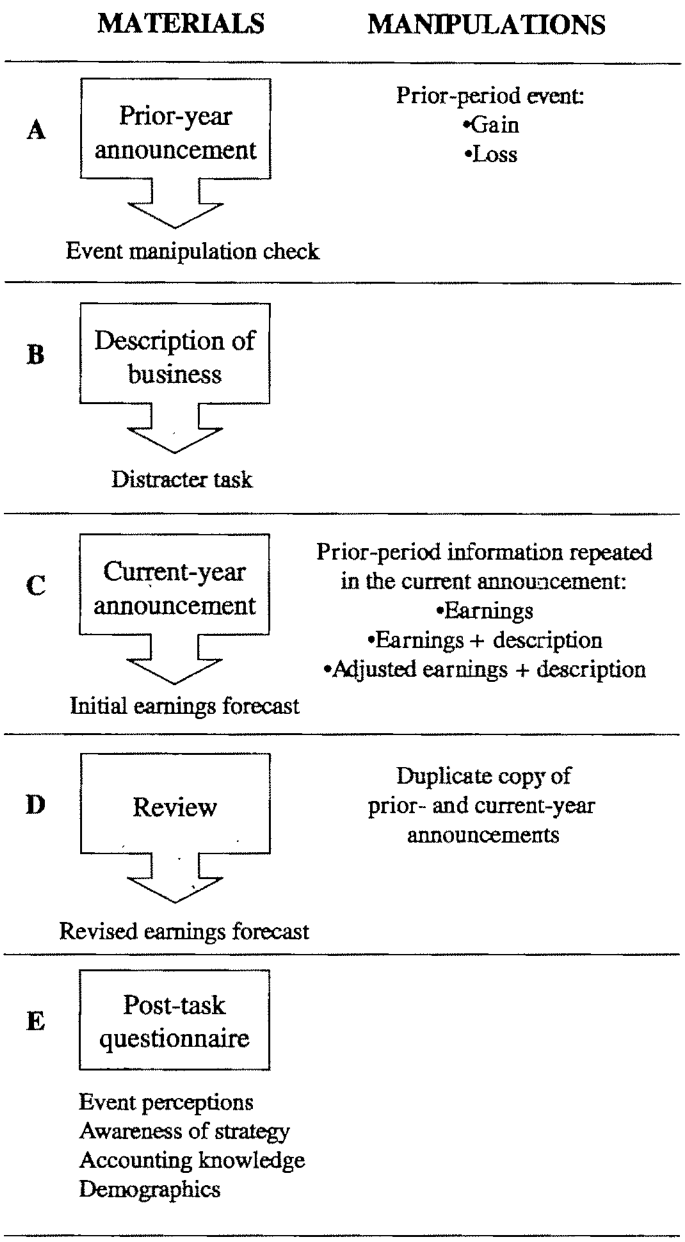
I created the prior-period gain announcements by reversing the prior-period earnings and adjusted-earnings amounts. The symmetry in the gain and loss announcements ensures that the prior-period event is the same in dollars for both a gain and a loss, and that the difference between the percentage changes in earnings is the same for both a gain and a loss. Figure 2 presents the prior-year announcements that were provided to investors in the first part of the experiment. As one item in a short series of questions, investors were also asked to identify the amount of the gain or loss on disposal. This allows me to verify that investors had previously identified the information needed to adjust for that event when asked later to forecast earnings.

A distracter task followed in the second part of the experiment, clearing investors' short-term memories as would occur naturally with the passage of time before investors receive the next earnings announcement. Specifically, investors were asked a series of questions based on their reading of excerpts from the company's description of business in recent 10-K filings.

Figure 3 presents the current-year announcements that were provided to investors in the third part of the experiment, with the repeated prior-period information manipulated between subjects. Investors were then asked to forecast earnings for the next year. Investors were prevented from returning to the prior-year announcement. However, after reporting their initial earnings forecasts, investors were presented with a duplicate copy of the prior- and current-year announcements in the fourth part of the experiment, after which they were again asked to forecast earnings for the next year.

The experiment concluded with a post-task questionnaire. The post-task questions were designed to help assess whether differences might remain in investors' revised forecasts because of (1) differences in investors' perceptions about the prior-period event, or (2) differences in investors' understanding of the accounting information and their ability to compute adjusted earnings. The questionnaire also collected demographic information.

FIGURE 1
Order of Experimental Materials and Manipulations



Investors and Financial Incentives

I proxy for reasonably informed individual investors by gathering data from 44 M.B.A. students from a Graduate Business School in the United States and 65 upper-year undergraduate accounting students from a School of Accountancy in Canada, yielding a total of

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FIGURE 2
Prior-Year Announcements

G & G Snack Foods
Prior-Year Results

			19X1
		Sales	$21,097,000
One of the following:	Gain	Earnings before unusual items	$206,000
		Gain on disposal of property	318,000
		Net earnings	$524,000
	Loss	Earnings before unusual items	$524,000
		Loss on disposal of property	318,000
		Net earnings	$206,000

Weighted average number of shares: 4,013,000

Per share amounts:

One of the following:	Gain	Earnings before unusual items	$0.05
		Gain on disposal of property	$0.08
		Net earnings	$0.13
	Loss	Earnings before unusual items	$0.13
		Loss on disposal of property	$0.08
		Net earnings	$0.05

According to Gerald B. Schreiber, G & G's Chief Executive Officer, "We are developing and implementing new marketing approaches which we believe will ultimately increase our supermarket sales of soft pretzels and result in a contribution to profits."

FIGURE 3
Current-Year Announcements

G & G Snack Foods Reports
19X2 Results

G & G Snack Foods Corp. (NASDAQ: GGSF) today announced operating results for the current year 19X2.

Sales for the current year increased to $24,979,000 from sales of $21,097,000 in the prior year.

One of the following (formatting has been added to highlight the changes across conditions):

Level of Prior-Period Information	Prior-Period Event	
	Loss	Gain
Earnings	Net earnings for the current year **increased to $491,000 from net earnings of $206,000** in the prior year. Net earnings per share increased to $0.12 compared to net earnings per share of $0.05 in the prior year. The weighted average number of shares outstanding was 4,013,000 in both years.	Net earnings for the current year **decreased to $491,000 from net earnings of $524,000** in the prior year. Net earnings per share decreased to $0.12 compared to net earnings per share of $0.13 in the prior year. The weighted average number of shares outstanding was 4,013,000 in both years.
Earnings + description	Net earnings for the current year **increased to $491,000 from net earnings of $206,000** in the prior year. Net earnings per share increased to $0.12 compared to net earnings per share of $0.05 in the prior year. The weighted average number of shares outstanding was 4,013,000 in both years. **The prior year's net earnings include a $318,000 after-tax loss on the sale of property, or $0.08 per share.**	Net earnings for the current year **decreased to S491,000 from net earnings of $524,000** in the prior year. Net earnings per share decreased to $0.12 compared to net earnings per share of $0.13 in the prior year. The weighted average number of shares outstanding was 4,013,000 in both years. **The prior year's net earnings include a S318,000 after-tax gain on the sale of property, or $0.08 per share.**
Adjusted earnings + description	Net earnings for the current year **decreased to $491,000 from adjusted earnings of $524,000** in the prior year. Net earnings per share decreased to $0.12 compared to adjusted earnings per share of $0.13 in the prior year. The weighted average number of shares outstanding was 4,013,000 in both years. **The prior year's adjusted earnings exclude a $318,000 after-tax loss on the sale of property, or $0.08 per share.**	Net earnings for the current year **increased to $491,000 from adjusted earnings of $206,000** in the prior year. Net earnings per share increased to $0.12 compared to adjusted earnings per share of $0.05 in the prior year. The weighted average number of shares outstanding was 4,013,000 in both years. **The prior year's adjusted earnings exclude a $318,000 after-tax gain on the sale of property, or $0.08 per share.**

Commenting on these financial results, G & G Snack Foods Chief Executive Officer Gerald B. Schreiber stated: "Our food service results continue to be strong. We continue to implement improvements in our operations. We remain very optimistic about the results for the next year."

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104 useable responses.[7] Demographic information collected at the end of the experiment indicates that most participants were in the final year of their respective academic programs, that they were likely to have the necessary knowledge and experience to complete the task, and that approximately one-half had prior investment experience.[8]

These students volunteered to participate in response to announcements made in financial statement analysis, finance, and intermediate/advanced financial accounting classes. Participants (hereafter, investors) completed the experiment in small groups. Within each type (M.B.A. and Accounting), investors were randomly assigned to between-subjects conditions in blocks of six.[9]

For participating in the experiment, investors received a cash payment in local currency of $10. To encourage effort, investors were also entered in a lottery for a bonus of $50. Investors were informed that there would be one such lottery for every 20 participants, that their forecasts would be compared to those of a panel of experts who received the same information, and that the more accurate their predictions, the more times their names would be entered into the lottery.[10]

Summary of Hypotheses

Hypotheses are presented graphically in Figure 4. The first set of hypotheses is that investors will adjust more for a transitory prior-period event when reminded of the event in the current announcement. Thus, investors are expected to forecast higher earnings when information about a transitory prior-period gain is repeated in the current-period announcement and lower earnings when information about a transitory prior-period loss is repeated. The second and third sets of hypotheses examine whether these "reminder effects" are due to two incremental factors: the availability of the prior-period event in working memory and the integration of the prior-period event into the stated earnings benchmark. Therefore, in the second set of hypotheses, investors are expected to forecast higher earnings when a clear, quantitative description of a transitory prior-period gain is included in the current-period announcement, and to forecast lower earnings when a clear, quantitative description of a transitory prior-period loss is included. In the third set of hypotheses, holding the description constant, investors are expected to forecast higher earnings when the comparative prior-period earnings stated in the announcement are adjusted for the gain, and to

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[7] Five investors (two M.B.A.s, three Accounting) provided revenue forecasts instead of earnings forecasts for one or both of their requested forecasts. Data from these investors are excluded from analyses, but results of the hypotheses tests are similar if these investors' earnings forecasts are included when available.

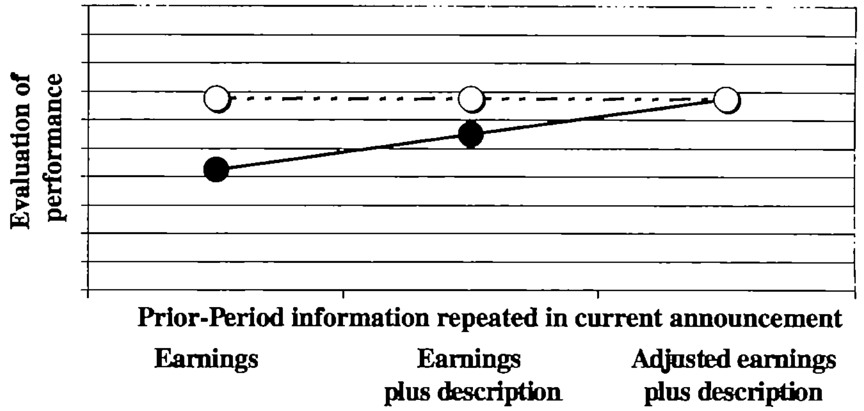
[8] Individual investors often invest substantially in specific equity securities (DeBondt 1998) and are important market participants (Lipe 1998). Accounting standard setters have institutionalized concerns for the inferences of reasonable investors (Statement of Financial Accounting Concepts No. 1, FASB 1978, ¶34; CICA 1996, Section 1000.19), and securities regulators have voiced concerns for average or typical investors (SEC 1995, No 33-7183 [Executive Summary]; SEC 1998, Release No 33-7512r [Disclosure Principles] and No 33-7512f [¶C.1.(b)]). A growing body of research also examines the judgments of individual investors (e.g., Hirst et al. 1995; Maines and Hand 1996; Kennedy et al. 1998; Lipe 1998; Hirst et al. 1999; Nelson et al. 2003).

[9] I test for an interaction between investor type (M.B.A. or Accounting) and each of the contrasts used to test the hypotheses. Although there are marginally significant interactions with the contrasts used to test H1a ($p = 0.046$) and H1b ($p = 0.076$), the results of H1a and H1b are directionally similar under separate analyses by investor type. There are no significant interactions with the contrasts used to test the remaining hypotheses (all $p > 0.10$).

[10] Investors were not informed of the specific algorithm used to determine the number of times their names would be entered into the lottery. A small group of accounting professors from the graduate business school served as the expert panel. This group judged all six cases, presented in unique randomized orders (plus three additional gain cases used in pilot-testing). Lottery winners were contacted via email approximately two to four weeks after participating.

FIGURE 4
Hypotheses

Panel A: Investors' Evaluations of Performance for Prior-Period Gain Conditions



Specific contrasts for investors' initial evaluations with a transitory prior-period gain[a]

H1a: Reminders: $\mu_{earnings} < (1/2\ \mu_{earnings+description} + 1/2\ \mu_{adjusted\ earnings+description})$

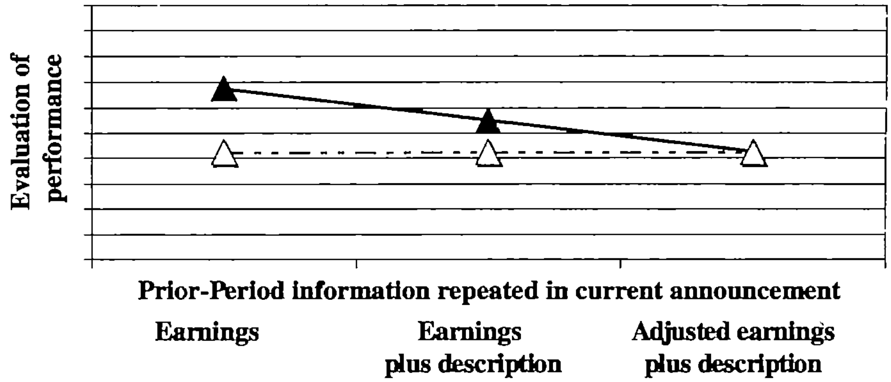
H2a: Availability: $\mu_{earnings} < \mu_{earnings+description}$

H3a: Integration: $\mu_{earnings+description} < \mu_{adjusted\ earnings+description}$

Specific contrasts for revisions in investors' evaluations with a transitory prior-period gain[b]

H4: Correction: $\Delta\mu_{earnings} > (1/2\ \Delta\mu_{earnings+description} + 1/2\ \Delta\mu_{adjusted\ earnings+description})$, where $\Delta\mu_{condition}$ is defined as "Revised $\mu_{condition}$ − Initial $\mu_{condition}$"

Panel B: Investors' Evaluations of Performance for Prior-Period Loss Conditions



Specific contrasts for investors' initial evaluations with a transitory prior-period loss[a]

H1b: Reminders: $\mu_{earnings} > (1/2\ \mu_{earnings+description} + 1/2\ \mu_{adjusted\ earnings+description})$

H2b: Availability: $\mu_{earnings} > \mu_{earnings+description}$

H3b: Integration: $\mu_{earnings+description} > \mu_{adjusted\ earnings+description}$

Specific contrasts for revisions in investors' evaluations with a transitory prior-period loss[b]

H4: Correction: $\Delta\mu_{earnings} < (1/2\ \Delta\mu_{earnings+description} + 1/2\ \Delta\mu_{adjusted\ earnings+description})$, where $\Delta\mu_{condition}$ is defined as "Revised $\mu_{condition}$ − Initial $\mu_{condition}$"

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[a] Initial evaluations are presented with solid lines. [b] Revised evaluations are superimposed using dotted lines.

forecast lower earnings when the prior-period earnings are adjusted for the loss. The final hypothesis examines whether investors self-correct their evaluations. Specifically, investors are expected to revise their earnings forecasts to reduce initial differences after re-examining the prior-period announcement.

IV. RESULTS

Manipulation Check

Nearly all investors (93.2 percent) correctly identified the prior-period gain or loss in the first part of the experiment. Thus, investors were aware of the prior-period event and had identified the information they would need to adjust for that event when assessing later disclosures. Hypothesis tests yield similar results when investors who did not correctly identify the prior-period event are excluded from the analyses.

Preliminary Analyses

Before investigating the specific hypotheses, I applied a 2 × 3 × 2 mixed analysis of variance (ANOVA) to test for an overall effect of the prior-period event (*gain* or *loss*) and the inclusion of prior-period information in the current announcement (*earnings, earnings plus description,* or *adjusted earnings plus description*) on investors' forecasts (*initial* and *revised* after re-examining a duplicate copy of the prior- and current-year announcements). Preliminary analyses indicated non-normality of the residuals, unequal variances across conditions, and significant outlying observations. Therefore, I rank investors' initial and revised forecasts, and I report non-parametric tests for my analyses (Kachelmeier and Messier 1990, 216–217; Neter et al. 1996, 777–779). Table 1 presents investors' mean, median, and mean ranked earnings forecasts for the 2 × 3 × 2 mixed design.

I find a significant two-way between-subjects interaction of the prior-period event and the level of prior-period information included in the current announcement ($F_{2,\,98} = 5.14$, $p = 0.008$), modified by a significant three-way interaction with the within-subject forecast rank ($F_{2,\,98} = 10.25$, $p < 0.001$).[11] This indicates that investors were influenced by the inclusion of prior-period information differently for the prior-period gain and loss conditions, and were also influenced differently in their initial and revised earnings forecasts.

Table 2 summarizes the planned contrasts used to test the specific hypotheses. Investors' mean ranked earnings forecasts for the prior-period gain and loss conditions are presented graphically in Figure 5, Panels A and B, respectively. I report the results of each hypothesis below.

Hypothesis Tests

Reminders of Prior-Period Gains and Losses (H1)

The first set of hypotheses tests whether investors evaluate a company more favorably when information about a transitory prior-period gain is repeated in the current-period announcement (H1a) and less favorably when information about a transitory prior-period loss is repeated (H1b). Consistent with H1a, the mean of investors' ranked forecasts across the earnings-plus-description and adjusted-earnings-plus-description conditions when a reminder of the prior-period gain is present is significantly higher than in the earnings condition when no reminder is present ($p < 0.001$, one-tailed). Consistent with H1b, the mean

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[11] p-values are reported for two-tailed tests, unless noted as one-tailed.

TABLE 1
Investors' Earnings Forecasts

Prior-Period Disposal[b]	Forecast[c]	Prior-Period Information Repeated in Current Announcement[d] Earnings	Earnings + Description	Adjusted Earnings + Description
Panel A: Investors' Mean Earnings Forecasts[a] (Standard Deviation)				
Gain	Initial	552.8 (196.1)	692.5 (144.4)	759.0 (160.4)
	Revised	634.1 (191.6)	652.8 (178.8)	748.1 (171.6)
Loss	Initial	619.6 (177.1)	493.2 (77.0)	545.8 (107.4)
	Revised	536.0 (87.2)	489.1 (75.9)	553.5 (102.8)
Panel B: Investors' Median Earnings Forecasts[a] (Interquartile Range)				
Gain	Initial	500.0 (134.0)	737.0 (206.0)	800.0 (225.0)
	Revised	607.5 (225.0)	614.0 (220.0)	800.0 (295.0)
Loss	Initial	562.5 (85.0)	500.0 (64.0)	500.0 (124.0)
	Revised	533.0 (127.0)	491.0 (47.0)	512.5 (94.0)
Panel C: Investors' Mean Ranked Earnings Forecasts[a] (Standard Deviation)				
Gain	Initial	82.5 (64.0)	141.7 (50.1)	155.5 (55.3)
	Revised	117.8 (58.4)	128.9 (60.0)	150.2 (59.3)
Loss	Initial	107.0 (49.0)	63.2 (35.2)	80.2 (49.3)
	Revised	78.2 (51.1)	59.4 (34.0)	85.4 (45.6)

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[a] Earnings forecasts are in $000s. With two forecasts from 104 observations, ranked earnings forecasts range from 1 to 208.

[b] The prior-period event is manipulated between subjects as either a gain or loss on disposal of property. The disposal was fully disclosed in the prior-period earnings announcement received by investors.

[c] Forecasts are a within-subjects factor with two levels: initial and revised. Investors are initially prevented from returning to the prior announcement. However, after reporting their initial earnings forecasts, investors are provided with a duplicate copy of the prior and current announcements, and are then asked to forecast earnings again for the next year.

[d] The prior-period information repeated in the current-period earnings announcement is manipulated between subjects at three levels: earnings, earnings plus description, or adjusted earnings plus description. In the earnings condition, the current earnings announcement compares current-period earnings to prior-period earnings, without any mention of the prior-period event. A clear, quantitative description of the prior-period event is added in the earnings-plus-description condition. In the adjusted-earnings-plus-description condition, the clear, quantitative description of the prior-period event is included, and current-period earnings are compared to prior-period-adjusted earnings.

of investors' ranked forecasts across the earnings-plus-description and adjusted-earnings-plus-description conditions when a reminder of the prior-period loss is present is significantly lower than in the earnings condition when no reminder is present ($p = 0.013$, one-tailed). The remaining hypotheses examine the cognitive mechanisms that contribute to these differential investor judgments.

Availability (H2)

The second set of hypotheses examines the effects of the availability of the prior-period event in working memory. I hypothesize that investors evaluate a company more favorably when a clear, quantitative description of a prior-period gain is included in the current announcement (H2a) and less favorably when a clear, quantitative description of a prior-period loss is included (H2b). Consistent with H2a, investors' ranked forecasts with a

TABLE 2
Planned Contrasts for Hypothesis Tests on Investors' Ranked Earnings Forecasts[a]

Description	Contrast (L)[d]	Directional Hypothesis	Estimate ($\hat{L}$)	t	p[e]
Panel A: Planned Contrasts on Investors' Ranked Earnings Forecasts in the Prior-Period Gain Conditions[b]					
Investors' initial ranked forecasts[c]					
H1: Reminders	$\mu_{earnings} - (½\ \mu_{earnings+description} + ½\ \mu_{adjusted\ earnings+description})$	< 0	−66.12	−4.43	<0.001
H2: Availability	$\mu_{earnings} - \mu_{earnings+description}$	< 0	−59.21	−3.41	<0.001
H3: Integration	$\mu_{earnings+description} - \mu_{adjusted\ earnings+description}$	< 0	−13.82	−0.80	0.214
Revisions in investors' ranked forecasts[c]					
H4: Correction	$\Delta\mu_{earnings} - (½\ \Delta\mu_{earnings+description} + ½\ \Delta\mu_{adjusted\ earnings+description})$, where $\Delta\mu_{condition}$ is defined as "Revised $\mu_{condition}$ − Initial $\mu_{condition}$"	> 0	+44.31	+3.92	<0.001
Panel B: Planned Contrasts on Investors' Ranked Earnings Forecasts in the Prior-Period Loss Conditions[b]					
Investors' initial ranked forecasts[c]					
H1: Reminders	$\mu_{earnings} - (½\ \mu_{earnings+description} + ½\ \mu_{adjusted\ earnings+description})$	> 0	+35.29	+2.27	0.013
H2: Availability	$\mu_{earnings} - \mu_{earnings+description}$	> 0	+43.80	+2.45	0.008
H3: Integration	$\mu_{earnings+description} - \mu_{adjusted\ earnings+description}$	> 0	−17.02	−0.98	0.835
Revisions in investors' ranked forecasts[c]					
H4: Correction	$\Delta\mu_{earnings} - (½\ \Delta\mu_{earnings+description} + ½\ \Delta\mu_{adjusted\ earnings+description})$, where $\Delta\mu_{condition}$ is defined as "Revised $\mu_{condition}$ − Initial $\mu_{condition}$"	< 0	−29.91	−2.51	0.007

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[a] Descriptive statistics are provided in Table 1.

[b] The prior-period event is manipulated between subjects as either a gain or loss on disposal of property. The disposal was fully disclosed in the prior-period earnings announcement received by investors.

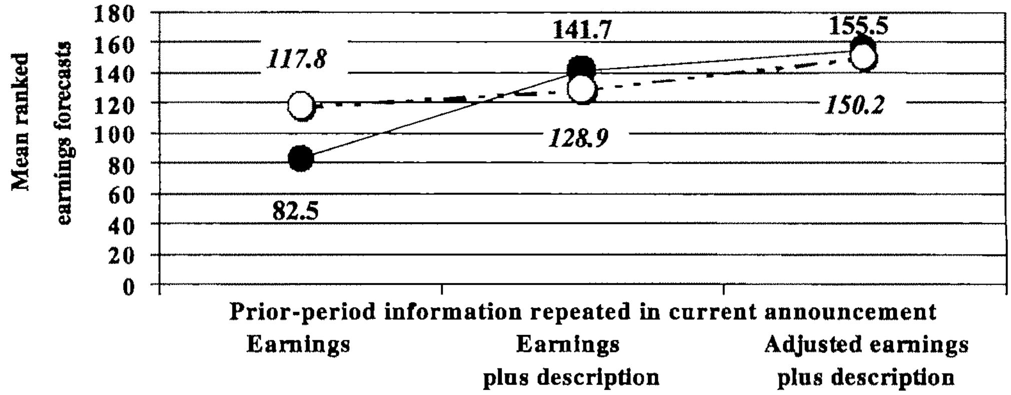
[c] Forecasts are a within-subjects factor with two levels: initial and revised. Investors are initially prevented from returning to the prior announcement. However, after reporting their initial earnings forecasts, investors are provided with a duplicate copy of the prior and current announcements, and are then asked to forecast earnings again for the next year.

[d] The prior-period information repeated in the current-period earnings announcement is manipulated between subjects at three levels: earnings, earnings plus description, or adjusted earnings plus description. In the earnings condition, the current earnings announcement compares current-period earnings to prior-period earnings, without any mention of the prior-period event. A clear, quantitative description of the prior-period event is added in the earnings-plus-description condition. In the adjusted-earnings-plus-description condition, the clear, quantitative description of the prior-period event is included, and current-period earnings are compared to prior-period adjusted earnings.

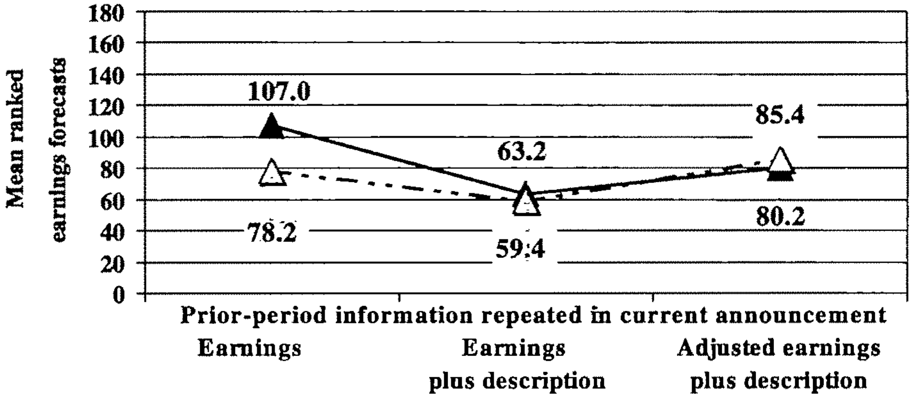
[e] Reported p-values are one-tailed, consistent with directional hypotheses.

FIGURE 5
Results

Panel A: Investors' Mean Initial and Revised Ranked Earnings Forecasts for Prior-Period Gain Conditions[a]



Panel B: Investors' Mean Initial and Revised Ranked Earnings Forecasts for Prior-Period LossConditions[a]



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[a] Initial evaluations are presented with solid lines. Revised evaluations are superimposed using dotted lines.

prior-period gain are significantly higher in the earnings-plus-description condition than in the earnings condition ($p < 0.001$, one-tailed). Consistent with H2b, investors' ranked forecasts with a prior-period loss are significantly lower in the earnings-plus-description condition than in the earnings condition ($p = 0.008$, one-tailed).

The differences in investors' ranked forecasts are also consistent with investors' identification of the prior-period event in written explanations of their forecasts. With the description present, 70.6 percent of investors identified the prior-period event in their written explanations of their initial earnings forecast. Only 44.1 percent of investors did so when the description was absent. These proportions are significantly different ($p = 0.049$ under Fisher's exact test).

Integration (H3)

The third set of hypotheses examines the incremental effect of integration. I hypothesize that even when a clear, quantitative description is present, investors evaluate a company more favorably when the comparative prior-period earnings number stated in the current announcement is adjusted for the prior-period gain (H3a) and less favorably when adjusted for the prior-period loss (H3b). Contrary to H3a, investors' ranked forecasts are not significantly higher when the stated prior-period earnings are adjusted for the prior-period gain ($p = 0.214$, one-tailed). Also, contrary to H3b, investors' ranked forecasts are not significantly lower when the stated prior-period earnings are adjusted for a prior-period loss ($p = 0.835$, one-tailed).

The written explanations investors provided for their forecasts suggest that equal proportions of investors adopted adjusted earnings as the appropriate earnings benchmark, consistent with the lack of a significant difference in investors' forecasts. In the earnings-plus-description condition, 70.6 percent of investors identified the prior-period event in their written explanations. This suggests that the majority of these investors preferred to adjust for the prior-period event and adopted adjusted earnings as their reference point. In the adjusted-earnings-plus-description condition, 77.8 percent did not identify the prior-period event in their written explanations. This suggests that the majority of these investors adopted the adjusted-earnings reference point as provided. The difference in these proportions is not statistically significant ($p = 0.588$ under Fisher's exact test).

Inferences and Corrections (H4)

The final hypothesis examines whether investors reduce their initial differences after re-examining both the prior- and current-year announcements. Consistent with reducing the effects of H1a, the mean *increase* in investors' ranked forecasts across the earnings-plus-description and adjusted-earnings-plus-description conditions with a prior-period gain (when a reminder of the gain was present in the current announcement) is significantly less than in the earnings condition (when no reminder of the gain was already present in the current announcement) ($p < 0.001$, one-tailed). Consistent with reducing the effects of H1b, the mean *decrease* in investors' ranked forecasts across the earnings-plus-description and adjusted-earnings-plus-description conditions with a prior-period loss (when a reminder of the loss was present in the current announcement) is significantly less than in the earnings condition (when no reminder of the loss was already present in the current announcement) ($p = 0.007$, one-tailed).

To investigate whether the within-subjects manipulation and repeated forecast task introduced a demand effect leading investors to change their forecasts, I examine the changes in investors' earnings forecasts for each experimental condition. I find that investors significantly revise their forecasts only in the earnings conditions, when no reminder of the prior-period event had been present in the current announcement. Specifically, investors significantly *increased* their revised forecasts when no description of the prior-period gain had been present in the current announcement (mean change in ranked forecasts in the earnings condition with a prior-period gain = +35.25, $p = 0.023$ under a Wilcoxon signed-rank test), and significantly *decreased* their revised forecasts when no description of the prior-period loss had been included (mean change in rank forecasts in the earnings condition with a prior-period loss = −28.84, $p = 0.048$ under a Wilcoxon signed-rank test). However, investors did not significantly change their forecasts when a description of the prior-period event had been included and when the stated prior-period earnings had also been adjusted for the gain or loss.[12] Thus, the significant forecast revisions that I find are not likely to be caused by a general tendency to switch between earnings benchmarks. Rather, the pattern of change in investors' ranked forecasts suggests that investors consistently adjust for the prior-period event when the relevant prior-period information is available.

Supplemental Analyses

Perceptions Regarding the Prior-Period Event

Investors' forecast revisions suggest that they perceived the prior-period event as nonrecurring and, in turn, viewed adjusted earnings as the appropriate reference point in evaluating current earnings. Although the experimental materials never explicitly described the prior-period event as nonrecurring, I verified through post-experimental questions that (1) investors viewed the prior-period event as generally nonrecurring (mean estimated likelihood of recurrence = 21.4 percent, which did not differ across disclosures: $F_{2,101} = 0.75$, $p = 0.473$), and (2) the majority of investors viewed adjusted earnings as the more appropriate reference point (94.2 percent, which did not differ across disclosures: $p = 0.362$ under Fisher's exact test). Thus, although I cannot state definitively that applying an adjusted earnings benchmark in this context is normative, my results suggest that it is descriptive of what reasonable investors prefer to do when the relevant prior-period information is available.

Operationalizing Availability in Practice

Results suggest that the availability of the prior-period event in working memory is a necessary and sufficient condition for reasonably informed investors to correct the unintentional differences in their judgments. However, the mere presence of a quantitative description may not always be sufficient to ensure its availability. Because a *clear*, quantitative description would encourage less favorable evaluations of a company with a prior-period loss, managers of such companies have an incentive to use the flexibility in a mandated reporting standard to strategically *obscure* the presentation of that description. Prior research suggests that the interpretation and application of accounting standards by managers (see Hanley et al. [1996] on closed-end mutual funds), by advisors (see Cuccia et al. [1995] on tax practitioners), and even by auditors (Hackenbrack and Nelson 1996) can be affected by incentives. In this setting, companies with a prior-period loss could issue an earnings announcement that buries the description within additional information, thus increasing investors' cognitive load and decreasing the chance that investors consider the prior-period loss.

To provide evidence on this possibility, I collected data for two supplemental conditions, using modified materials for the prior-period-loss conditions used in my main experiment. Specifically, I expand the current announcement to include additional management discussion and analysis, and I present the quantitative description within this added discussion. Thus, the same quantitative description is now always present, and intervening information separates it from the stated prior-period earnings. I then manipulate, between subjects, the ease with which investors can integrate the prior-period loss into the stated earnings benchmark as previously described, by stating either *earnings* or *adjusted earnings* for the prior period. If the mere presence of a quantitative description ensures the availability of the prior-period event in working memory, then I should find no significant difference in investors' forecasts between the two conditions. If intervening information renders the prior-period event less available for integration, then I should find that investors forecast significantly higher earnings when they receive earnings instead of adjusted earnings. If such a significant difference does occur, then allowing investors to re-examine the prior-year information (in which the loss remains clearly stated) would allow investors to revise their forecasts to reduce the difference.

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[12] With a prior-period gain, the mean changes in ranked forecasts in the earnings-plus-description and adjusted-earnings-plus-description conditions are −12.82 and −5.30, respectively (not significantly different from zero under Wilcoxon signed-rank tests, both $p > 0.10$). With a prior period loss, the mean changes in ranked forecasts in the earnings-plus-description and adjusted-earnings-plus-description conditions are −3.76 and +5.14, respectively (not significantly different from zero under Wilcoxon signed-rank tests, both $p > 0.10$).

The supplemental data was gathered from an additional 77 M.B.A. students attending the same Graduate Business School and participating under the same financial incentives as in the main experiment. Investors' mean, median, and mean ranked earnings forecasts for the supplemental conditions are reported in Table 3.

I find that investors ranked forecasts are significantly lower for the loss company in the adjusted-earnings condition ($L = \mu_{earnings} - \mu_{adjusted\ earnings}$, $\hat{L} = +17.38$, $t_{75} = +1.76$, $p = 0.041$ one-tailed). Further, when allowed to re-examine the prior-year information, investors significantly *decreased* their revised forecasts if the current announcement stated prior-period earnings as the performance benchmark (mean change in ranked forecast $= -18.9$, $p = 0.002$ under a Wilcoxon signed-rank test), but did not significantly change their forecasts when prior-period adjusted earnings had been stated (mean change in ranked forecast $= -1.4$, $p = 0.722$ under a Wilcoxon signed-rank test).

These results suggest that the mere presence of a quantitative description is not always sufficient to ensure its availability. Regulators might consider defining both the content and the location of a mandated disclosure to help investors avoid overly optimistic evaluations of prior-period loss companies.

V. DISCUSSION

Using a controlled experimental setting, I examine how managers' disclosures of prior-period events in earnings announcements influence investors' evaluations of company performance. Consistent with the archival findings of Schrand and Walther (2000), experimental results suggest that repeating information about a transitory prior-period gain or loss in the current-period earnings announcement affects investors' adjustment for the prior-period event and, in turn, their evaluations of current earnings performance. I find that investors adjust for the prior-period event when a clear, quantitative description of the event is repeated in the current-period announcement, even though investors had previously identified the event. The resulting differences in investor forecasts are reduced when investors re-examine the prior-period announcement, suggesting that the initial differences in investor evaluations are at least partially unintentional, due to limitations in investors' memory for the prior-period event. I do not find any significant evidence that investor forecasts differ intentionally due to asymmetric beliefs about earnings persistence.

These results help to explain the rarity of disclosures for prior-period losses in earnings announcements. Such disclosures would indeed be expected to decrease investor evaluations of current performance.

Even if investors' over-optimism is later corrected, understanding its underlying causes remains important for two reasons. First, in real-world capital markets, more sophisticated investors can benefit from correcting the anomaly at the expense of less sophisticated investors. Improving the regulatory requirements should allow less sophisticated decision makers to act like more sophisticated decision makers (Maines et al. 2000). Second, even if the *same* investors later make the correction, improving the disclosure requirements could increase the speed and efficiency with which the correction occurs.

TABLE 3
Investors' Earnings Forecasts in Supplemental Prior-Period Loss Conditions, with the Description Present but Separated From Earnings by Intervening Information

	Prior-Period Earnings Repeated in Current Announcement[c]	
Forecasts[b]	**Earnings**	**Adjusted Earnings**
Panel A: Investors' Mean Earnings Forecasts[a] (Standard Deviation)		
Initial	593.3 (146.9)	550.9 (99.4)
Revised	530.0 (94.6)	539.9 (125.5)
Panel B: Investors' Median Earnings Forecasts[a] (Interquartile Range)		
Initial	575.0 (81.0)	540.0 (115.0)
Revised	550.0 (127.0)	527.3 (119.0)
Panel C: Investors' Mean Ranked Earnings Forecasts[a] (Standard Deviation)		
Initial	91.2 (43.1)	73.8 (43.4)
Revised	72.3 (44.6)	72.4 (46.0)

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[a] Earnings forecasts are in $000s. With two forecasts from 77 investors, forecast ranks range from 1 to 154.

[b] Forecasts are a within-subjects factor with two levels: initial and revised. Investors are initially prevented from returning to the prior announcement. However, after reporting their initial earnings forecasts, investors are provided with a duplicate copy of the prior and current announcements, and are then asked to forecast earnings again for the next year.

[c] The prior-period earnings repeated in the current-period earnings announcement is manipulated between subjects at two levels: earnings or adjusted earnings. In the earnings condition, the current earnings announcement compares current-period earnings to prior-period earnings. In the adjusted-earnings condition, current-period earnings are compared to prior-period adjusted earnings. In both conditions, a quantitative description of the prior-period loss is always present but separated from the stated prior-period earnings with additional MD&A text.

I do not find a significant incremental effect of adjusting the prior-period earnings stated as a benchmark in the current-period announcement if a clear description of the prior-period gain or loss is already in the announcement. However, supplemental data suggest that there would be an incremental effect of adjusting the stated earnings benchmark if managers render the prior-period event less available by "burying it" in other information. Thus, it seems that mandating both the provision and the location of such descriptions is necessary to help investors avoid overly optimistic evaluations of prior-period loss companies.

The implications of my experiment extend to recent guidelines for pro forma earnings (FEI and NIRI 2001; NIRI 2002; SEC 2003a, 2003b). The SEC (2003a) now requires companies that present pro forma earnings to provide a reconciliation to earnings as defined under Generally Accepted Accounting Principles (GAAP). However, if a company has experienced a transitory prior-period loss, then a manager can choose to avoid any reminder about the prior-period loss in the current-period announcement, and present only a GAAP earnings benchmark. As such, no reconciliation or reference to the prior-period loss would likely be required in the current-period announcement. Indeed, companies do not consistently opt to report pro forma earnings over time (Bhattacharya et al. 2004), and when they do report pro forma earnings, companies have applied different definitions of pro forma earnings from one period to the next (Grant and Parker 2001; Jaffe 2002; Bhattacharya et al. 2004; but see SEC 2003a). While extant research suggests that managers have incentives to increase current pro forma earnings by eliminating temporary, nonrecurring losses from their current income, my results suggest that managers have incentives to *not* remind investors about such losses in the following period, prompting overly optimistic evaluations of performance. In combination, these results emphasize the need for comparability and consistency (FASB 1980) in the reporting of non-GAAP financial performance measures (also see Maines et al. [2002] on nonfinancial performance measures). Future research that expands the experimental setting to a multi-period or a multi-person interactive study would provide additional insights into how managerial credibility (e.g., Hirst et al. 1999) can affect the influence of managers' prior-period benchmark disclosures on investors' evaluations.

Other research has examined whether investor sophistication moderates the influence of disclosure differences on investor judgments (see, e.g., Elliott [2004] and Fredrickson and Miller [2004] on pro forma earnings). In contrast, Hirshleifer and Teoh (2003) suggest a different perspective in which market mispricings result from "partially attentive" investors. Hirshleifer and Teoh's (2003) analytic model assumes that any investor can neglect relevant aspects of information, without fully realizing that their attention is imperfect, even if the investor is otherwise capable of analyzing the neglected aspect of information. The current findings suggest that reasonable investors do indeed neglect relevant aspects of information (the transitory prior-period gain or loss), even when investors had previously identified the information and even though those same investors were sophisticated enough to later correct their initial judgments. Results suggest that, if information and the level of investor sophistication are held constant, investors are still likely to neglect relevant aspects of information due to memory limitations.

Future research should also consider the extent to which these results generalize to other benchmark disclosure settings, particularly those settings in which investors experience substantial uncertainty about the appropriate benchmark. Consistent with Schrand and Walther (2000), I examine a situation in which a company has a transitory gain or loss on disposal of property in the prior reporting period. With a nonrecurring event, prior-period adjusted earnings is arguably considered the appropriate reference point, as it was by the investors participating in my experiment. However, Lewellen et al. (1996), Soffer (1996), Byrd et al. (1998), and Porac et al. (1999) document the biased selection of peer groups for stock-return comparatives in annual proxy statements. Brown and Goetzmann (1997) and diBartolomeo and Witkowski (1997) investigate the bias in self-reported investment styles in mutual funds, while Cooper et al. (2003) examine the strategic use of name changes for mutual funds. Higher uncertainty about the appropriate benchmark in these other settings could increase investors' reliance on disclosures that reduce the computational complexity associated with adjusting for the event (e.g., Hirst et al. 2003), either because they no longer know how to adjust appropriately for the prior-period event, or because the expected cost of doing so is greater than the expected benefit (Plumlee 2003). Higher uncertainty could also increase investors' reliance on the disclosure as a signal about the appropriateness of a particular reference point.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 269–287

The Effect of Changes in Regulation and Competition on Firms' Demand for Accounting Information

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ABSTRACT: This paper examines whether the *type* of competition in a market influences the association between the *intensity* of competition and demand for accounting information. Empirical analysis using a sample of 1,578 hospital-year observations from hospitals in California finds no association between the intensity of competition and demand for accounting information in the presence of quality competition; however, when firms compete on price, the need to control costs leads to a positive association between the two. In addition, the change in the unit of analysis in the hospital industry from the payer to the ailment increased the demand for accounting information for all California hospitals. This study suggests that competition intensity increases the demand for accounting information under one type of competition (price), but not another (quality competition), and thereby contributes to our understanding of the reasons for the mixed evidence in prior literature on the relation between competition and the demand for accounting information.

Keywords: *competition; managerial accounting; regulation.*

Data Availability: *Data used in this study are publicly available from the California Office of State Health Planning and Development.*

I. INTRODUCTION

This paper examines how regulation influences the type of competition that prevails in a market and consequently affects the association between the intensity of competition and firms' demand for accounting information.[1] Despite persistent arguments that an increase in competition increases the demand for accounting information (e.g., Cooper 1995; Kaplan 1983; Kaplan and Cooper 1998; Shank and Govindarajan 1989), empirical research has found mixed results. Some studies have found a positive association between increased competition and the use of more refined management accounting systems (Cavalluzzo et al. 1998; Hill 2000; Pizzini 2003), while others have found inconsistent or

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[1] The empirical analysis uses expenditures on accounting as a proxy for the demand for accounting information.

I thank Ramji Balakrishnan, Rajiv Banker, Carolyn Callahan, Mark Covaleski, Joseph Fisher, Satish Joshi, Leslie Eldenburg, Tom Linsmeier, Joan Luft, Mike Shields, Naomi Soderstrom, and two anonymous reviewers for their comments. I also thank workshop participants at the Big10+ Research Conference; The University of Iowa; the 2002 Management Accounting Research Conference, Austin, Texas; Michigan State University; The University of Texas at Dallas; and the University of Wisconsin–Madison for their valuable comments.

Editor's Note: This paper was accepted by Terry Shevlin, Senior Editor.

Submitted March 2002
Accepted February 2004

no association (Khandwalla 1972; Libby and Waterhouse 1996). Part of this inconsistency arises because competition is a multidimensional construct, which has been empirically operationalized in a variety of ways. Competition can be characterized in terms of either the *type*, i.e., the parameters that firms compete on such as price, quality, or product variety, or the *intensity*, which is a function of the number of firms in a market and their relative sizes.

Although some empirical studies examine the association between the *intensity* of competition and the demand for accounting information without controlling for the type of competition (e.g., Hill 2000; Libby and Waterhouse 1996), other studies suggest that the *type* of competition influences the demand for accounting information. For example, Hansen (1998) analyzes firms competing under Cournot competition and finds a nonlinear, U-shaped relationship between the level of competition (measured as the number of firms competing in a market) and firms' expenditures on cost data collection.[2] Krishnan et al. (2002) use an experimental economy, which is an operationalization of Hansen's (1998) model, and show that individuals' choices of the level of product-costing accuracy depend not only on the current level of competition (market structure), but also on the prior level of competition (market history). Neither Hansen (1998) nor Krishnan et al. (2002) examine variations in the association between the demand for accounting information and the intensity of competition for other types of competition such as Bertrand. Moreover, both studies focus on the *level* of competition, which is a function only of the number of firms in the market, rather than the *intensity* of competition, which is a function of the number of firms and their relative sizes. Callahan and Gabriel (1998) provide theoretical and experimental evidence that the type of competition influences the value of more accurate product cost information. Firms competing in a Cournot market benefit from increased product cost accuracy, whereas firms competing in a Bertrand market do not benefit from more accurate cost information. While Callahan and Gabriel (1998) examine variations in the association between two types of competition and the demand for accounting information, they do not vary the level of competitive intensity within the two markets.

This paper demonstrates that the association between the demand for accounting information and the intensity of competition is a function of the type of competition. Economic theory predicts that the regulatory structure of the market influences the type of competition that prevails in a market and that cost-plus regulation leads to quality competition, while fixed-price regulation leads to price competition. In addition, quality competition reduces firms' incentives to control costs, regardless of competition intensity (Bajari and Tadelis 2001; Folland et al. 1997; Joskow 1980). Consequently, when firms compete on quality, there is lower demand for accounting information for cost control, and this demand is unlikely to vary as a function of competition intensity. On the other hand, when firms compete on price, higher competition intensity increases the incentives for cost control (Shleifer 1985), increasing the demand for accounting information.

The California hospital market offers an attractive setting to empirically test these predictions. Prior to 1983, all hospitals in the United States were reimbursed for their Medicare patients and most other privately insured patients retrospectively, based on cost plus a mark-up. Cost-plus reimbursement allowed hospitals to recover all their expenses, regardless of whether these expenses were efficient or excessive, which provided no incentive to control costs. Hospitals could increase their profitability merely by increasing the number of patients treated. Since doctors preferred hospitals with higher quality and any costs incurred in increasing quality was passed on to the patients, hospitals offered advanced technology, better facilities, and extensive services to attract doctors and more patients. The higher the competition intensity, the greater was the level of services provided (Keeler et al. 1999). Consistent with the predictions of economic theory that cost-plus regulation leads to quality competition (Bajari and Tadelis 2001; Folland et al. 1997; Joskow 1980), considerable empirical evidence demonstrated that in the presence of cost-plus regulation, competition in the hospital industry was based on quality rather than price (see Gaynor and Haas-Wilson [1999] for a review), which lowered the demand for accounting information for cost control.

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[2] Cournot competition refers to a market where firms first commit to the quantity they plan to offer, and then choose the price. Bertrand competition refers to a market where firms first commit to a price, and then choose their quantities (Martin 1998; Varian 1992).

Quality competition led to an explosive increase in health care costs in the U.S.[3] To improve hospitals' incentives for cost control, beginning in 1983, the federal government changed the regulatory reimbursement structure for Medicare patients from cost-plus to fixed-price. This fixed-price was based on the average cost of all hospitals competing in the market. During this same period, there was also an increase in the market share of managed care plans, which provided negotiated fixed-price reimbursements. Both these changes lead to what Shleifer (1985) refers to as "yardstick competition" where all the firms in the market competed against a market average "shadow firm." Fixed-price regulation shifted the basis of competition in the hospital market from quality to price (Dranove et al. 1993), which lowered the average price in markets with higher competition. Fixed-price regulation encouraged cost-reduction because if a firm reduced costs and its competitors did not, it could increase profits (Lambert and Larcker 1995; Shleifer 1985). Hence cost became an important competitive weapon influencing market share and profit. Hospitals located in markets with greater intensity of competition had greater incentives to reduce costs, because they needed to maintain patient volumes to recover their fixed costs. This increased the demand for accounting information for cost reduction in such markets.

In this paper, I empirically analyze data from California hospitals and find evidence that there is a significant positive association between the intensity of competition and the demand for accounting information during the price-based competition period ushered in by the fixed-price regulatory environment; and no association during cost-plus regulation when competition was based on quality.

The remainder of the paper is organized as follows. Section II uses regulatory intervention and contracting theory to motivate the hypotheses. Section III contains a description of the data and methodology. Section IV discusses the results and Section V discusses conclusions, limitations, and avenues for future research.

II. THEORY AND HYPOTHESES

Cost-Plus Regulation and Quality Competition

A fundamental issue in contracting is determining the payment terms. Economic theory suggests that in the presence of asymmetric information (e.g., when the seller has information about production cost that the buyer does not), the buyer screens the seller by offering the seller a menu of contracts from which the seller chooses one, thereby revealing his private information (Laffont and Tirole 1993). Bajari and Tadelis (2001) show that in practice, menus of contracts are seldom used and that most contracts are simple cost-plus or fixed-price. They analytically show that cost-plus contracts discourage cost-savings efforts because the buyer or regulator is the residual claimant to cost savings and rent and extracts all the benefits of the cost savings. Because the regulator cannot determine true costs, he can rarely argue that the firm is run inefficiently (Shleifer 1985).

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[3] Health care costs grew at a rate of 12.60 percent per year from 1970 to 1983 (Letsch et al. 1988).

Joskow (1980) offers a theory of how cost-plus regulation encouraged quality competition in the U.S. hospital industry. In Joskow's (1980) model, the presence of health insurance reduces the price-sensitivity of patients. As a result, the relative prices charged by competing hospitals do not have a significant effect on a patient's hospital selection. However, patients value the quality of services offered by a hospital and are likely to prefer one that offers higher quality services. Similarly, physicians prefer hospitals with higher quality because it reduces their risk by offering access to advanced technology and a full range of diagnostic and therapeutic facilities. Pecuniary motives may also influence a physician who is compensated based on a fee-for-service, to choose a high-quality hospital because the physician can order excessive services for patients, thus maximizing his pecuniary compensation.

In Joskow's (1980) model, when reimbursement is based on cost, the hospital is motivated to maximize the quantity of services offered, much beyond the point where the marginal cost of an additional service is equal to the expected value of the service to the patient. Since price is not a variable influencing a patient or a physician's choice of hospital, the primary mechanism by which a hospital can attract patients is by increasing the quality of its services. The more intense the competition, the higher the quality of services offered. Consistent with Joskow's (1980) theoretical argument, considerable empirical research has found that prior to 1983, cost-plus reimbursement regulation in the U.S. hospital industry encouraged quality competition and resulted in a "medical arms race," wherein hospitals competed by providing excessive medical services, to attract physicians who brought the patients (Dranove and White 1994; Gaynor and Haas-Wilson 1999; Hughes and Luft 1991; Noether 1988; Robinson and Luft 1985, 1988; Zwanziger and Melnick 1988).

Under cost-plus regulation, hospitals were guaranteed profitability regardless of the intensity of competition, which created very little demand for accounting information for cost control. In addition, accounting information was of limited use for pricing because payers/insurers contracted based on cost, or for product-mix decisions because the cost-plus reimbursement system ensured that all services consumed by insured patients were profitable. Often the costs of unprofitable services such as those consumed by the uninsured could be shifted to the fully insured patients (Dranove 1988). Case-study evidence shows that hospital accounting systems during the cost-plus regulatory period were aimed at providing a reasonably accurate view of the financial picture of the hospital, and provided no details about the costs associated with specific patients, procedures, or ailments (Narayanan 2000). The intensity of competition did not impact hospital behavior with respect to efficiency and cost-control, and was not likely to influence hospitals' demand for accounting information. Thus, during the cost-plus regulatory regime when competition is quality based, I predict that there will be no association between the intensity of competition and the demand for accounting information.

> **H1:** When firms compete on quality, there will be no association between the intensity of competition and the demand for accounting information.

Fixed-Price Regulation and Price Competition

Bajari and Tadelis (2001) show that in the absence of costly renegotiation, the fixed-price contract gives the seller (producer) the strongest incentives to reduce cost. Under fixed-price regulation, the firm is the residual claimant to the cost savings or rent that may occur, which increases the firm's incentives to reduce costs, thus increasing its demand for accounting information. Recognizing this ability of fixed-price regulation to improve incentives for cost control and in an attempt to reduce the explosive growth in health care costs as a result of quality competition, the federal government introduced a "Prospective Payment System" (PPS) for hospital inpatient services rendered to Medicare patients. The PPS, which was phased in over a four-year period beginning in October 1983, represented a radical departure from retrospective cost-based reimbursement, to a prospective method of payment and a patient- (versus hospital-) level reimbursement scheme. The PPS began paying hospitals on a prospectively determined fixed price for each Medicare patient upon discharge from the hospital. This fixed price varied depending on the type of illness as defined by the Diagnosis Related Group (DRG). DRG is a classification system for hospital inpatients that categorizes patients into distinct groups according to the nature and intensity of the services.[4]

PPS fixed-price regulation increases a firm's incentives to be the lowest cost producer because the firm retains the difference between price and cost. Firms in markets with greater intensity of competition have greater difficultly in obtaining sufficient number of patients to break even, and hence have greater incentives to reduce costs. As shown in Shleifer's (1985) theoretical model of yardstick competition, this lowers the shadow price in markets with higher competition and leads to a negative relationship between competitive intensity and price.

In addition to fixed-price regulation for Medicare patients, the regulatory environment for privately insured patients also changed after 1983. Prior to 1983, insurance laws in California did not allow insurance companies to influence patients' choice by using economic mechanisms such as reduced co-payments, nor could they steer patients to low-cost providers (Dranove et al. 1993). When these regulations were lifted in 1983, there was a considerable increase in the market share of managed care organizations. Managed care organizations selectively contract with hospitals, and contracts are typically awarded based on the hospital's willingness to accept discounts (Dranove et al. 1998). Selective contracting influenced the price elasticity of demand for hospital services. Prior to the emergence of selective contracting, demand for hospital services for commercially insured patients was relatively inelastic with respect to price. However, under selective contracting, a hospital that raises prices risks losing contracts to other hospitals, which makes the demand curve for hospital services more price-elastic (Zwanziger and Melnick 1988). Hospitals located in markets with higher intensity of competition have to compete more vigorously on price to obtain managed care contracts.

The increase in market share of managed-care plans versus indemnity-based plans in the private insurance sector, therefore, had the same effect as the change in regulation for Medicare patients from cost-plus to fixed-price, and provided incentives for cost reduction, especially in markets with higher intensity of competition. The combined effect of these two changes was to reduce the average price in markets with higher intensity of competition. Indeed, empirical research in health care finds that the shift from cost-plus to fixed-price reimbursement changed the nature of hospital market competition from quality-based to price-based (Dranove et al. 1993; Gruber 1994; Meltzer et al. 2002; Zwanziger and Melnick

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[4] For example, suppose a patient is admitted to the hospital for coronary by-pass surgery. Under the cost-based system, the hospital receives funding for each additional day of care, diagnostic test, and medical procedure. However, under the PPS, the hospital receives a lump-sum payment equal to the market average cost of all patients who have a coronary by-pass (DRG 107). If the cost of treating the patient is less than the average, then the hospital earns a profit. If the cost is greater than the average, the hospital suffers a loss, which is equal to the difference between the reimbursement and the cost of treatment. Thus, PPS greatly increases the incentives for the hospital to reduce costs (Ellis and McGuire 1993).

1998). Thus, in the sample examined here, I expect to find that fixed-price regulation is associated with price-based competition.

In response to the increased pressures to control costs under price-based competition, hospitals began to explore approaches such as product-line costing, using a standardized case as a benchmark, and providing physicians with costs as additional information to use while determining appropriate medical treatment (Coombs 1987; Eldenburg 1994). Lambert and Larcker (1995) also find that hospitals increased the use of bonus contracts with CEOs. In addition, the increased diversity and complexity of the DRG system created intense product-cost measurement difficulties. Under such circumstances, there is a greater incentive for opportunistic behavior (Demski and Magee 1992) and the demands placed on the accounting system and the pressures it operates under are likely to vary as a function of environmental features such as the intensity of competition. In a survey of 580 hospitals, Hill (2000) finds that hospitals that reported adopting more sophisticated costing systems after PPS were more likely to be located in markets with more hospitals. Thus, my second hypothesis predicts that during the period of price-based competition, there will be a positive association between competition intensity and the demand for accounting information.

H2: When competition is price-based, there will be a positive association between the intensity of competition and the demand for accounting information.

PPS Fixed-Price Regulation and Unit of Analysis

The change in the regulation from cost-plus to fixed-price also had an independent effect on hospitals' accounting systems. Under cost-plus regulation, the payer or the insurer was the unit of analysis; hence hospitals aggregated accounting information at the payer level. Typically a hospital had contracts with only five or six payers (Dranove et al. 1993). However, PPS necessitated aggregation of accounting information at the level of the DRG. Because it changed the unit of analysis from about five or six payers to 500 DRGs, it placed greater demands on hospitals' accounting systems.[5] Hence, I predict that after the institution of PPS, firms will have an increase in demand for accounting information regardless of the intensity of competition.

H3: The change in regulation from cost-plus to fixed-price is associated with an increase in the demand for accounting information, independent of the intensity of competition.

III. DATA AND METHODOLOGY

The empirical analysis uses data from 460 community-based hospitals in California, a state with a large number of hospitals facing varying degrees of competitive intensity. Data were obtained from the California Office of State Health Planning and Development (OSHPD). I use data for 1979–1980 and 1980–81 for the cost-plus regulatory period,[6] which is at least two years prior to the introduction of the Medicare PPS.[7] For the fixed-price regulatory period, I use data for 1996–97 and 1997–98 because this is several years after the introduction of PPS when managed care was firmly in place.[8] By 1996, the market share of managed care plans had stabilized to a fairly high level in California, whereas during the late 1980s and early 1990s, managed care plans were in the process of building market share (Vita 2001). The sample includes only short-stay general hospitals and excludes psychiatric hospitals and long-term care hospitals because several of the services these hospitals offer are exempt from the PPS.[9]

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[5] Reporting requirements for regulatory authorities (such as Medicare) typically have a major influence on the design of cost accounting systems (Cleverley 1984).

[6] For convenience, the discussion uses the ending years. Thus, 1979–1980 is referred to as 1980, 1980–81 as 1981 and so on.

[7] The Medicare PPS was established by the Social Security Amendment of 1983 (Public Law 98-21) and became effective for hospitals for fiscal years beginning after October 1, 1983 (Latta and Keene 1990). This system was phased in over a four-year period to ease hospitals' transition (Meltzer et al. 2002). Hence the first year that hospitals were fully reimbursed by the PPS system was 1988–1989.

Variables and Empirical Model for Testing Price versus Quality Competition

As stated earlier, prior literature has found that cost-plus regulation is associated with quality competition, and fixed-price regulation is associated with price competition. I empirically test this because it is important to establish that this association holds in my dataset for testing H1 and H2. To test these associations, I use a fundamental prediction of economic theory, which states that if prices decrease as the intensity of competition increases, then firms are competing on price, whereas if prices increase as the intensity of competition increases, then firms are competing on non-price attributes such as quality (Satterthwaite 1979; Schmalensee 1989; Stigler 1968; Weiss 1989). A number of empirical studies in several industries have also concluded that a negative association between price and competition intensity represents price competition, and a positive association between price and competition intensity represents non-price competition (see Weiss [1989] for a review).[10]

Based on the above predictions of economic theory and prior empirical findings, I use the association between the price received by the hospital and the intensity of competition to differentiate between price and quality competition. I use data from 1980 and 1981 to examine the association between price and the intensity of competition during the cost-plus regulatory period, and data from 1997 and 1998 to examine the association between price and intensity of competition during the fixed-price regulatory period. The following paragraphs summarize the empirical model and variables used to test these associations.

Dependent Variable: Price

I use *Net Revenue per Patient Day* as the measure of price received by the hospital. This is the net revenue received by the hospital for medical services (after subtracting discounts), divided by the number of patient days and reflects the average price received by the hospital. I use this measure because prior research suggests that the best measure of price in the hospital industry is revenue after adjusting for hospital discounts and length of stay (LOS) (Keeler et al. 1999).

Independent Variable: Competition Intensity

Joskow (1980) acknowledges that it is very difficult to quantify the intensity of competition. While the *level* of competition in a market can be measured by the number of firms in a certain area, measurement of competitive *intensity* is less straightforward. Industrial economics theory postulates that merely using level-based measures such as the number of firms in a market is not sufficient in the study of competitive behavior, and that it is also important to examine the relative market shares of firms in a market (Martin 1993). For example, consider two markets, both of which have four hospitals. In one market, each hospital has 25 percent share and in the other, the market shares are 50 percent, 30 percent, 15 percent, and 5 percent, respectively. The competitive dynamics and intensity are different in each of the markets because in the former market no firm plays a dominant role, but in the latter market, the firm with the 50 percent market share is the dominant firm, while the firms with the 15 percent and 5 percent shares are likely to be price-taking fringe firms (Martin 1993). In addition to higher market power, the greater size of operations and market share provides the larger firm with other associated benefits such as economies of scale and scope, and monopsonistic power over suppliers, which lowers its marginal cost and enables the firm to obtain higher margins.

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[8] Financial data over different years are deflated using the average Consumer Price Index (http://www.bls.gov), and expressed in 1980 dollars.

[9] This is also consistent with prior research in health care, which typically excludes these hospitals while examining hospital behavior (e.g., Dranove et al. 1993; Keeler et al. 1999; Lynk 1995).

[10] A vast majority of these studies use the Herfindahl-Hirschman Index (HHI) to measure the intensity of competition. A few others use the number of firms in the market.

I use the Herfindahl-Hirschman Index (HHI) as the primary measure of the intensity of competition. The HHI is defined as the sum of the squared market shares (expressed as proportions) of all firms in the market. The HHI is one of the most popular measures of the intensity of competition and is used by antitrust agencies such as the U.S. Department of Justice and the Federal Trade Commission, and by economists (e.g., Keeler et al. 1999; Kim and Singal 1993; Lynk 1995). Because it combines information about the number of firms in a market and their size distribution, the HHI is regarded as a superior measure of competition compared to the four-firm concentration ratio, or the number of firms in the market (Schmalensee 1989). For ease of interpretation, the HHI is reverse coded, i.e., measured as (1 – HHI). The market share for an individual hospital is its number of patients as a percentage of total patients discharged.

Consistent with prior studies in the health care literature, each county is defined as a separate hospital market (e.g., Frank and Salkever 1991; Lynk 1995).

Control Variables

Ownership-Type: The U.S. hospital industry has firms with different ownership forms such as non-government nonprofits (including church and community-run hospitals), for-profit (investor-owned hospitals), and government (state, city, county, and district hospitals). Most of the economics literature hypothesizes that nonprofit hospitals have different objective functions than for-profit hospitals (see Needleman [2001] for a review). To examine if there are differences amongst hospitals based on ownership type, the analyses include two dummy variables to control for ownership status: *For-Profit*, which takes the value of 1 if the hospital is a for-profit hospital and 0 otherwise; and *Government*, which takes the value of 1 if the hospital is a government hospital, and 0 otherwise. The non-government nonprofit hospital is the omitted dummy variable. If for-profit hospitals indeed maximize profits, then their prices should be higher than those charged by nonprofit and government hospitals. In addition, average prices received should be lower for government hospitals because they tend to attract a larger proportion of uninsured and underinsured patients (Newhouse 1989).

Staffed Beds: Prior research suggests that hospital size influences its revenues, primarily because larger hospitals have greater market power, which allows them to negotiate higher prices with insurers (French 1996; Robinson and Phibbs 1989). Therefore, the analysis includes the number of staffed beds as a control for hospital size.

Proportion of Medicare Patients: The cost-plus reimbursement system encouraged the excessive provision of reimbursable services for Medicare patients. Hence, I expect that the proportion of Medicare patients will be positively associated with prices under cost-plus regulation. Under PPS, a hospital with a greater proportion of Medicare patients has a smaller patient pool where prices are still negotiable, and is likely to have a lower average price.

Proportion of Medi-Cal Patients: Medi-Cal, the California Medicaid program, has common features with the Medicare program; hence it is expected to behave similarly.

Proportion of Outpatients: Under the cost-plus reimbursement system, Medicare and Medi-Cal outpatients were also reimbursed retrospectively based on cost plus a mark-up, and hospitals had incentives to provide excessive services to outpatients. However, under fixed-price regulation, Medicare and Medi-Cal outpatients usually generate less revenue than inpatients. Moreover, non-Medicare and non-Medi-Cal outpatients are more likely to be uninsured (Almeida et al. 2001). Hence, I expect that the proportion of outpatients will be positively associated with price in the cost-plus period and negatively associated with price during the fixed-price period.

Occupancy Rate: Occupancy rate is not likely to influence the prices during the cost-plus period. However, during the fixed-price period, a hospital with a higher occupancy rate may have a higher market share and hence be able to command higher prices from insurers due to its market power. Alternatively, if the occupancy is comprised of underinsured or uninsured patients, then a higher occupancy rate may be associated with lower prices.

Length of Stay (*LOS*): Prior research in health care suggests that *LOS* affects hospital behavior and performance (Lynk 1995). Thus, *LOS* is used as a control variable. Because patients receive more intensive and reimbursable services during the first few days of a hospital stay, higher *LOS* is likely to reduce the average price received per day under both types of regulation.

Empirical Model

I use the following model to test the association between regulation and competition type:

$$\begin{aligned}\textit{Net Revenue Per Patient Day} = {} & \alpha + \beta_1(\textit{Competition Intensity}) \\ & + \beta_2(\textit{For-Profit}) + \beta_3(\textit{Government}) + \beta_4(\textit{Staffed Beds}) \\ & + \beta_5(\textit{Proportion of Medicare Patients}) \\ & + \beta_6(\textit{Proportion of Medi-Cal Patients}) \\ & + \beta_7(\textit{Proportion of Outpatients}) \\ & + \beta_8(\textit{Occupancy Rate}) + \beta_9(\textit{LOS}) + \varepsilon_i. \qquad (1)\end{aligned}$$

This model is estimated separately for the cost-plus regulatory period and the fixed-price regulatory period. A positive coefficient for *Competition Intensity* suggests that a higher intensity of competition is associated with higher prices, which is consistent with firms competing on the basis of non-price attributes such as quality. A negative coefficient for *Competition Intensity* suggests that higher competitive intensity lowers prices, which is consistent with a market where price is the basis of competition. The coefficient for *Competition Intensity* should be positive during the cost-plus regulatory period and negative during the fixed-price regulatory period.

Variables and Empirical Model for Hypotheses 1, 2, and 3

Dependent Variable

Demand for Accounting Information: As stated in the introduction, I use expenditures on accounting as a proxy for the demand for accounting information. The OSHPD database provides data on general accounting and patient accounting costs. The *General Accounting* cost center accumulates non-patient billing and accounting activities of a hospital (i.e., preparation of ledgers, budgets, etc.). The *Patient Accounting* cost center accumulates direct expenses related to the processing of patient charges (i.e., claims, bills, and patient-level accounting activities).

The primary dependent variable is *Total Expenditures on Accounting*, which is the sum of general accounting and patient accounting. To control for hospital size, volume, and operating efficiency, total expenditures on accounting is divided by total operating cost and expressed as a proportion of total operating cost.

Independent Variables

Competition Type: This is a dummy variable that takes the value of 1 when competition is price-based (i.e., during 1997 and 1998 when regulation was fixed-price) and 0 when competition is quality-based (i.e., during 1980 and 1981 when regulation was cost-plus).

*Competition Intensity * Competition Type* interaction: This variable captures the association between the intensity of competition, the type of competition, and demand for accounting information. Because *Competition Type* is a dummy variable with the value of 0 when regulation is cost-plus, this variable will have a zero value in the presence of quality competition that existed during the cost-plus period. A positive coefficient on this variable implies that in the presence of price competition, hospitals with greater competition intensity have greater demand for accounting information.

Control Variables

In addition to the control variables mentioned in the previous section, this analysis includes *Data Processing Cost* as an additional control variable because the time period used for the study (1980, 1981, 1997, 1998) coincided with increased spending by hospitals on data processing. This ensures that the increase in accounting expenditures is not driven primarily by increased data processing costs. These costs include data collection, input, storage, data processing, and distributing output.

Empirical Model

Hypotheses 1, 2, and 3 are tested using the following regression model:

$$\begin{aligned}
&\textit{Total Expenditures on Accounting as a Proportion of Operating Cost}\\
&\quad = \alpha + \beta_1(\textit{Competition Intensity}) + \beta_2(\textit{Competition Type})\\
&\qquad + \beta_3(\textit{Competition Intensity * Competition Type}) + \beta_4(\textit{For-Profit})\\
&\qquad + \beta_5(\textit{Government}) + \beta_6(\textit{Data Processing Cost}) + \beta_7(\textit{Staffed Beds})\\
&\qquad + \beta_8(\textit{Proportion of Medicare Patients}) + \beta_9(\textit{Proportion of Medi-Cal Patients})\\
&\qquad + \beta_{10}(\textit{Proportion of Outpatients}) + \beta_{11}(\textit{Occupancy Rate}) + \beta_{12}(\textit{LOS}) + \varepsilon_i. \qquad (2)
\end{aligned}$$

The influence of competition intensity on total expenditures on accounting is equal to β_1 during the cost-plus regulatory period, and $\beta_1 + \beta_3$ during the fixed-price regulatory period. For results to be consistent with H1, β_1 should not be significantly different from zero. This would imply that the demand for accounting information is not associated with the intensity of competition during the cost-plus regulatory period when competition was quality-based.

Results are consistent with H2 if β_3 has a positive sign, which implies that in the presence of price competition, the demand for accounting information increases with increases in competition intensity. Because the variable *Competition Type* takes a value of 1 under PPS regulation and 0 otherwise, a positive sign on β_2 implies that the PPS regulation is associated with an increased demand for accounting information, as predicted by H3.

For-profit hospitals have more incentives to cut costs than nonprofit and government hospitals and consequently are likely to have a higher demand for accounting information. Hence, the coefficient on β_4 is expected to be positive. It is not possible to unambiguously predict the sign for the coefficient on government hospitals (β_5). On the one hand, these hospitals often obtain subsidies based on financial need, which lowers their incentive to cut costs. This reduces the benefits they would obtain from detailed accounting information. On the other hand, as Geiger and Ittner (1996) find, government organizations use cost system output to satisfy external requirements (such as the city or county legislature) and frequently implement more elaborate cost accounting systems.

Because the accounting system uses the data processing system for generating information and reports, data processing costs are likely to be positively associated with the expenditures on accounting (i.e., β_6 is likely to be positive). Larger hospitals may be able to use their market power to negotiate higher prices, reducing the need for accounting information for cost reduction purposes. Moreover, to the extent that there are economies of scale in collecting and disseminating accounting information, the expenditures on accounting may not vary proportionately with hospital size. Hence, the coefficient β_7 is predicted to be negative. Hospitals with higher proportion of Medicare and Medi-Cal patients are likely to require more accounting information for cost-shifting during the cost-plus period, and for cost reduction during the PPS period, which predicts positive values for β_8 and β_9. Outpatients generate more accounting paperwork per unit of revenue, thus β_{10} is expected to be positive. Occupancy rate may denote market power, which reduces the need for accounting information for cost reduction.

Alternatively, if the hospital beds are filled with uninsured and underinsured patients, then a higher occupancy rate increases the incentives for cost reduction, which increases the demand for accounting information. It is also not possible to predict the sign for length of stay because contracts differ among hospitals and payer groups. If a hospital is reimbursed to a greater extent based on per-diem rates, then a higher *LOS* reduces the incentives for cost reduction, decreasing the demand for accounting information. On the other hand, if the hospital is reimbursed to a greater extent with per-ailment or per-patient contracts, then a higher *LOS* is associated with greater incentives for cost reduction, which increases the demand for accounting information.

IV. RESULTS

Table 1 contains the descriptive statistics. During the cost-plus regulatory period, total expenditures on accounting were 1.34 percent of total operating cost, which increased to 2.81 percent during the fixed-price regulatory period (difference = 1.47, $t = 18.91$, $p < .001$). This increase of 1.47 percentage points suggests that hospitals are spending more on accounting systems in recent years. Expenditures on data processing increased significantly, from 0.27 percent of total operating cost during the cost-plus period to 1.76 percent of total operating cost during the fixed-price period. The proportion of Medicare patients decreased from 0.42 to 0.37 while the proportion of Medi-Cal patients increased from 0.20 to 0.27. Average *LOS* increased from 7.50 days to 8.71 days; however, the median *LOS* decreased from 5.48 days to 4.93 days. The proportion of outpatients increased significantly from 0.17 to 0.30.

Recall that prior research suggests that cost-plus regulation is likely to be associated with quality-based competition while fixed-price regulation is likely to be associated with price-based competition. To test these associations, *Net Revenue per Patient Day* is regressed as a function of *Competition Intensity* and other control variables as shown in

TABLE 1
Descriptive Statistics[a]

Variable	Cost-Plus Regulation Quality-Based Competition			Fixed-Price Regulation Price-Based Competition			t-test of Difference in mean (Fixed-Price–Cost-Plus Regulation)
	Mean	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**	
Total Expenditures on Accounting as a Percentage of Operating Cost	1.34%	1.23%	0.61%	2.81%	2.51%	2.13%	18.91***
Competition Intensity (1 − HHI) (Market level mean for 55 hospital markets)	0.58	0.67	0.32	0.55	0.65	0.33	0.49
Expenditures on Data Processing as a Percentage of Total Operating Expenses	0.27%	0.16%	0.30%	1.76%	1.55%	1.12%	36.98***
Staffed Beds	164.59	116.50	166.45	153.76	116.50	131.04	−1.66*
Proportion of Medicare Patients	0.42	0.44	0.15	0.37	0.35	0.18	−6.26***
Proportion of Medi-Cal Patients	0.20	0.15	0.21	0.27	0.18	0.24	6.63***
Proportion of Outpatients	0.17	0.15	0.11	0.30	0.23	0.20	17.29***
Occupancy Rate	54.44%	57.78%	18.94%	55.64%	54.13%	23.93%	1.24
Length of Stay (days)	7.50	5.48	8.72	8.71	4.93	11.61	2.70***

*, **, *** $p < .10$, $p < .05$, $p < .01$, respectively.

[a] Dollar values are deflated using the average consumer price index data obtained from the Bureau of Labor Statistics (http://www.bls.gov), and expressed in 1980 dollars.

Equation (1). I conduct separate estimations for the cost-plus and fixed-price regulatory periods (Table 2). In Panel 1 of Table 2, *Competition Intensity* is positively associated with net revenue per patient day. This implies that a hospital competing in a market with higher competition intensity commanded higher prices. These results suggest that competition during the cost-plus regulatory period was based on non-price attributes such as quality.

Panel 2 of Table 2 shows that during the fixed-priced period, hospitals with higher competition intensity had lower prices, as indicated by the negative sign on the *Competition Intensity* coefficient. This suggests that during the PPS period, hospital market competition is based on price. These results are also consistent with earlier empirical findings reported in the health care literature that conclude that the basis of hospital market competition has shifted from quality to price (e.g., Dranove et al. 1993; Meltzer et al. 2002; Zwanziger et al. 2000).

As predicted, government hospitals receive lower prices under both quality and price competition. Larger hospitals obtain higher prices under both types of competition suggesting that their greater market power allows them to negotiate higher prices with insurance companies. The proportion of a hospital's Medicare patients is associated with a higher average price during the cost-plus period, implying that hospitals provided more reimbursable services to Medicare patients during this period. Because the change in the Medicare regulation to fixed-price adversely affected the average price received by the hospitals, a higher proportion of Medicare patients is associated with lower average prices during the fixed-price period. The Medi-Cal program had similar changes in the reimbursement system; consequently, results observed for Medi-Cal patients are similar to those for Medicare patients. Hospitals with a greater proportion of outpatients had higher prices during the cost-plus period, indicating that they were admitting more profitable outpatients. Hospitals with higher occupancy rates obtained lower prices during both periods, which could imply that these hospitals attracted uninsured and underinsured patients and that they were not successful at shifting away all the treatment costs during the cost-plus period. As mentioned, patients usually receive more intensive and reimbursable services during the first few days of a hospital stay. As a result, higher *LOS* is associated with lower average price received per day.

Table 3 contains the results of estimating Equation (2), which tests H1, H2, and H3, and examines the demand for accounting information as a function of the type of competition and the intensity of competition using *Total Expenditures on Accounting as a Proportion of Operating Cost* as the dependent variable. In the estimated model, the coefficient on *Competition Intensity* is not statistically different from zero. This suggests that when competition is based on quality, the intensity of competition is not associated with the firm's demand for accounting information, which is consistent with H1.

Table 3 also shows a positive and significant coefficient on the *Competition Intensity * Competition Type* interaction term, which indicates that during the price-based competition that existed after the PPS regulatory change (when *Competition Type* = 1), hospitals in markets with greater intensity of competition spent more on accounting. These results are consistent with H2, which states that under price-based competition there will be a positive association between the intensity of competition and firms' demand for accounting information.

Evidence consistent with H3 can be discerned from the positive and significant coefficient on the *Competition Type* dummy variable in Table 3. Recall that this dummy variable takes a value of unity under the PPS fixed-price regulation, and 0 otherwise. The results in Table 3 suggest that hospitals had greater demand for accounting information after the PPS was introduced.

TABLE 2
Revenue Per Patient Day as a Function of the Type and Level of Competition (Test of Quality versus Price Competition)

$$\textit{Net Revenue Per Patient Day} = \alpha + \beta_1(\textit{Competition Intensity}) + \beta_2(\textit{For-Profit}) + \beta_3(\textit{Government}) + \beta_4(\textit{Staffed Beds}) + \beta_5(\textit{Proportion of Medicare Patients}) + \beta_6(\textit{Proportion of Medi-Cal Patients}) + \beta_7(\textit{Proportion of Outpatients}) + \beta_8(\textit{Occupancy Rate}) + \beta_9(\textit{LOS}) + \varepsilon_i.$$

	Panel A: Quality-Based Competition (Cost-Plus Regulation)		Panel B: Price-Based Competition (Fixed-Price Regulation)	
Predictor	**Predicted Sign**	**Parameter Estimates**	**Predicted Sign**	**Parameter Estimates**
Competition Intensity (1 − HHI)	+	171.21 (5.02)***	−	−343.09 (−2.25)**
For-Profit (1 = for-profit hospital, else 0)	+	20.63 (1.43)	+	−83.09 (−1.20)
Government (1 = government hospital, else 0)	−	−134.16 (−8.46)***	−	−222.17 (−2.73)***
Staffed Beds	+	0.15 (3.95)***	+	0.88 (3.72)***
Proportion of Medicare Patients	+	398.34 (8.81)***	−	−781.28 (−3.82)***
Proportion of Medi-Cal Patients	+	710.42 (23.88)***	−	−562.40 (−3.71)***
Proportion of Outpatients	+	361.19 (5.01)***	−	421.27 (1.12)
Occupancy Rate	+/−	−132.57 (−3.99)***	+/−	−357.33 (−2.90)***
Length of Stay	−	−8.29 (−9.38)***	−	−13.72 (−4.51)***
n		929		908
Intercept (t-statistics, p-value)		69.96 (1.42, $p < .16$)		2,050.07 (11.47, $p < .01$)
Adjusted R^2 (F-value of the regression)		0.45 (96.43)		0.18 (20.47)

*, **, ***: $p < .10$, $p < .05$, $p < .01$ respectively.
t-statistics are in parentheses.

TABLE 3
Determinants of Total Expenditures on Accounting as a Proportion of Operating Cost

$$\begin{aligned}&\textit{Total Expenditures on Accounting as a Proportion of Operating Cost}\\ &\quad = \alpha + \beta_1(\textit{Competition Intensity}) + \beta_2(\textit{Competition Type})\\ &\qquad + \beta_3(\textit{Competition Intensity*Competition Type}) + \beta_4(\textit{For-Profit}) + \beta_5(\textit{Government})\\ &\qquad + \beta_6(\textit{Data Processing Cost}) + \beta_7(\textit{Staffed Beds}) + \beta_8(\textit{Proportion of Medicare Patients})\\ &\qquad + \beta_9(\textit{Proportion of Medi-Cal Patients}) + \beta_{10}(\textit{Proportion of Outpatients})\\ &\qquad + \beta_{11}(\textit{Occupancy Rate}) + \beta_{12}(\textit{LOS}) + \varepsilon_i.\end{aligned}$$

Predictor	**Predicted Sign**	**Parameter Estimates**
Competition Intensity	Not significant	0.0024 (0.41)
Competition Type (1 if price competition, 0 if quality competition)	+	0.0061 (1.70)*
*Competition Intensity * Competition Type*	+	0.0057 (2.03)**
For-Profit (1 = for-profit hospital, else 0)	+	0.0026 (4.07)***
Government (1 = government hospital, else 0)	+/−	0.0002 (0.31)
Data Processing Cost	+	0.3024 (9.11)***
Staffed Beds	−	−7.17E-6 (−3.08)***
Proportion of Medicare Patients	+	0.0066 (0.70)
Proportion of Medi-Cal Patients	+	0.0137 (1.96)**
Proportion of Outpatients	+	0.0189 (5.12)***
Occupancy Rate	+/−	−0.0083 (−6.52)***
Length of Stay	+/−	6.08E-5 (0.87)
n		1,578
Intercept (t-statistics, p-value)		0.011 (2.01, $p < .05$)
Adjusted R^2 (F-value of the regression)		0.47 (76.36)

*, **, ***: $p < .10$, $p < .05$, $p < .01$ respectively.
t-statistics are in parentheses.

As predicted, for-profit hospitals spent more on accounting than nonprofit or government hospitals. Government hospitals do not appear to behave differently from nonprofits with regard to the demand for accounting information because the coefficient on the *Government* dummy is not statistically different from zero. The positive coefficient on *Data Processing Cost* implies that hospitals that spent more on data processing also spent more on accounting. Notice that the coefficients on *Competition Type* and the *Competition Intensity * Competition Type* interaction are statistically significant even after controlling for data-processing cost, which suggests that hospitals were not merely collecting additional information in response to the PPS, but rather using the additional information for decision making.

Hospital size, measured by staffed beds is negatively associated with total accounting expenditures, which could arise if larger hospitals enjoy scale economies in the collection and dissemination of accounting information. Moreover, the previous analysis for price showed that larger hospitals enjoy higher prices, which is likely due to their market power; thus they have a less urgent need to cut costs, which reduces their demand for accounting information. As predicted, hospitals with a greater proportion of Medi-Cal patients have higher accounting expenditures as these patients typically generate more paperwork. Hospitals with a greater proportion of outpatients also had higher accounting expenditures because of large amounts of record keeping. Similar to larger hospitals, those with higher occupancy rates have lower accounting expenditures.

Robustness Analyses

While the HHI is a standard measure of competition intensity, it places a relatively large weight on big firms. Additionally, the HHI declines very sharply from one-firm markets to four-firm markets. Koller and Weiss (1989) propose a transformation of the HHI (i.e., using the square root of HHI that addresses these two problems while retaining some of its advantages). In the current study, all the empirical analyses were replicated using this transformation. Results are substantively the same. In the tables, I present the results using the HHI because it provides a better summary of the entire concentration curve (Koller and Weiss 1989).

Results are robust to the elimination of influential observations with a Cook's D statistic greater than 1.0. Results are also robust to the exclusion of monopoly markets and teaching hospitals. As a sensitivity check, I replicated all the analyses using the total expenditures on accounting per patient as the dependent variable. Estimation results were substantively the same.

V. CONCLUSIONS

Prior studies examining the association between competition and the demand for accounting information have not distinguished between the *type* of competition and the *intensity* of competition. The findings from this study highlight the importance of making this distinction because the type of competition that prevails in a market influences the association between the demand for accounting information and the intensity of competition. Using longitudinal data from California hospitals, I provide empirical evidence that when competition is based on non-price attributes such as quality, there is no association between competitive intensity and firms' demand for accounting information; however, when competition is based on price, there is a positive association.

This study has several limitations. First, the analyses use expenditures in accounting as a proxy for the demand for accounting information. I assume that greater accounting expenditures will yield more detailed information for cost-reduction purposes. Accounting expenditures are only an indirect measure of the demand for accounting information. However, the empirical analyses include controls for other factors that may drive the demand for accounting information such as hospital size, patient-mix, capacity utilization, and operating efficiency.

Second, consistent with prior research in accounting and economics (e.g., DeFond and Park 1999; Dranove et al. 1993), this study uses the HHI as a primary measure of competition. The HHI is a continuous variable and assumes that a hospital market with two hospitals each having a 50 percent market share is twice as competitive as a monopoly hospital market. Markets with the same HHI may have different behaviors due to strategic interactions between firms, which would alter the nature of competition in different ways than suggested by the HHI.

Third, the increase in accounting expenditures may be driven by the more elaborate patient billing requirements imposed by Medicare and other managed care companies in the 1990s. However, anecdotal evidence suggests that hospitals with more elaborate patient billing systems typically integrate clinical, financial, and nonfinancial information with the billing function and use the output for managerial decision making (Mendenhall 1998). Furthermore, increased requirements for patient billing do not explain the change in association between competitive intensity and accounting expenditures.

Fourth, I do not examine the specific components of an accounting system. Such information is difficult to obtain from secondary data sources and can potentially only be obtained through a survey. However, a survey would only provide information on the current state and may not provide reliable information on the association between competition and the demand for accounting information during a previous regulatory period.

By demonstrating that the intensity of competition increases the demand for accounting information under one type of competition but not another, this study sheds light on the potential reasons for the prior mixed evidence in the accounting literature on the association between competition and demand for accounting information. In addition, this study contributes both to our understanding of the association between competitive intensity and firms' demand for accounting information, and the effects of regulation changes on the type or basis of competition that prevails in a market. The findings potentially generalize to other industries that have witnessed similar regulatory changes such as electric utilities, telecommunications, and airlines. In such industries, the results from cross-sectional studies of the association between competition intensity and the demand for accounting information conducted during a particular regulatory period may not hold after regulatory changes. Further, cross-sectional studies of firms under different regulatory regimes may be confounded. Hence, it is important for future researchers to control for the type of regulatory regime.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 289–313

The Role of Auditing in Investor Protection

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ABSTRACT: Protection of outside investors depends on the detection and punishment of resource diversion by corporate insiders, including managers and controlling shareholders. We focus on the role played in investor protection by self-interested auditors operating in a competitive audit market. In our setting, auditors represent the mechanism whereby detection of diversion occurs. We show that markets with relatively greater auditor penalties for audit failures and greater insider penalties for detected resource diversion have larger total investment levels, a higher proportion of the firm held by outsiders, higher audit resource investment, higher audit fees, and higher expected investment returns.

Keywords: *investor protection; differential auditor penalties; strategic auditing.*

I. INTRODUCTION

Recent research has investigated the role of investor protection on capital market development, firm valuation, the pace of new security issues, concentration of ownership, dividend policies, and other related issues (see Shleifer and Wolfenzon [2002] (hereafter SW) for a more extensive list). Securities endow their owners with defined rights (Hart 1995) that are critical to outside investors when managers or controlling shareholders (hereafter *insiders*) act in their own interests. The laws of the jurisdictions in which securities are issued, the willingness and ability of the judicial system to enforce those laws, and the likelihood that violations of investors' rights are detected and revealed are factors that determine the value of those rights. Collectively, these factors characterize the degree

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Helpful comments were provided by Anil Arya, Mark Bagnoli, Tony Greig, Frank Heflin, Jim Noel, Shane Dikolli, Bill Kinney, Yasuhiro Ohta, Jaewan Park, Phil Powell, Lynda Thoman, participants at workshops at the 2003 American Accounting Association Annual Meeting, Indiana University, The Ohio State University, and Purdue University, and two anonymous reviewers.

Editor's Note: This paper was accepted by Madhav Rajan, Editor.

Submitted July 2003
Accepted July 2004

of *investor protection* provided in a particular jurisdiction.[1] We extend investor protection models to focus explicitly on insider expropriation detection by self-interested auditors operating in a competitive audit market.

La Porta et al. (2000, 15) (LLSV) argue that the extent of financial market development is one of the most basic predictions arising from the investor protection literature. More protection from expropriation by insiders implies higher security valuation and, therefore, a more attractive setting for issuing securities. Shareholder protection is related to firms' valuations, the number of listed firms, and the rate at which firms go public (La Porta et al. 1997).

Investors recognize the risk of expropriation and penalize firms in less protective environments.[2] Because insiders bear these costs when they issue securities, they have an incentive to take steps to limit expropriation, including hiring an outside auditor to monitor their behavior and report to outside investors (Jensen and Meckling 1976). LLSV (2000) note that securities legislation and the SEC give auditors much of the responsibility for accurate financial representations in the U.S. Thus, auditors play an important role in the U.S. in insuring investor protection.[3] This role extends to most, if not all, capital markets. In this paper, we focus on the role of the auditor in enforcing and protecting outside investors' rights. The critical role of auditing in this context is to detect expropriations by insiders and, by doing so, to deter such behavior. Without detection of expropriation by insiders, the degree of investor protection provided in other forms is significantly weakened. Neither strictness of laws nor stringent enforcement matter if such laws or enforcement are not triggered. Thus, when raising external capital, insiders have incentives to retain auditors to provide outside investors with assurance that expropriations are limited. We focus on the relationship between auditors' incentives, specifically penalties due to audit failures, and the degree of outside participation in public offerings.

Auditors' incentives to detect insider expropriation vary across jurisdictions, particularly those incentives related to the penalties for failure to detect expropriation. Because we are interested in comparing the potential for outside ownership in emerging capital markets across countries, one premise of this paper is that the variation in expected legal penalties for audit failures is country-dependent. Given that auditors respond to incentives, then audit effectiveness, and hence investor protection, will also differ across countries. A legal liability survey conducted by the International Federation of Accountants (IFAC) (1995) details differences in auditor liability systems across countries. Forty-seven member bodies (e.g., the AICPA, the Japanese Institute of Certified Public Accountants, etc.) responded to

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[1] La Porta et al. (1998) (LLSV) consider how laws protecting investors differ across 49 countries, how law enforcement quality varies, and whether these variations matter for corporate ownership patterns. Their results indicate that investor protection is strongest in common-law countries, weakest in French-civil-law countries, with German- and Scandinavian-civil-law countries in the middle.

[2] Expropriation can take many forms. Insiders may simply engage in theft or fraud. Alternatively, insiders may sell the firm's products, its assets, or its securities at below market prices to themselves or another firm they control. Johnson et al. (2000) document instances of expropriation by controlling shareholders. Recent examples (or claims) of expropriation in the U.S. include Enron, Adelphia, Tyco, WorldCom, and Pharmor (e.g., see Eichenwald 2002).

[3] Recent empirical research in accounting has focused on the implications of investor protection for earnings management, accounting standards, and auditing. Leuz et al. (2003) find evidence that greater investor protection improves the quality of financial statements by reducing earnings management. Francis et al. (2001) document that accounting standards are more timely and transparent in countries with stronger investor protection laws. Fan and Wong (2001) consider whether Big 5 auditors can mitigate agency conflicts between controlling owners and minority shareholders, thus augmenting traditional corporate governance mechanisms. Hung (2000) documents evidence that greater investor protection improves the effectiveness of accrual accounting. Choi and Wong (2002) consider how different countries' legal environments affect auditor choice (Big 4 or non-Big 4) and audit fees, but they do not provide a direct empirical test of the predictions arising from our analytical results.

IFAC's survey. Several variations in auditor liability are noted. For example, in Belgium, lawyers have reduced incentives to bring cases to trial because they cannot charge contingent fees nor bring class action suits. Germany and Austria have a statutory damage cap in the case of auditor negligence for statutory audits. Third-parties in France must prove a direct causal link between the fault of the auditors and the resulting damage. These and other examples document variations in whether auditors are held jointly and severally liable versus proportionately liable, whether class action suits can be brought, whether attorney's fees are contingent, whether partners have unlimited personal liability, and whether countries permit punitive damages.

Wingate (1997) reports a risk rating across countries developed by an international insurance underwriter for a large global audit firm. The rating represents the "risk of doing business as an auditor" in a particular country and is based on all international audit firms' and other professional firms' claims experience, legal and regulatory environments, political and economic environments, and the professional accounting environment in a country. In addition, La Porta et al. (1997) provide a law enforcement index, which estimates the quality of the rule of law in a country from an investor perspective. Both of these ratings vary substantially across countries. And, in many cases, a country's ranking in Wingate's (1997) auditor-specific index differs significantly from its ranking in La Porta et al.'s (1997) law enforcement index.[4] These differences in risk ratings suggest that general investor protection can be decomposed into management incentives, auditor incentives, and institutional law enforcement incentives, and these types of incentives may not be aligned within or across countries.

IFAC argues that legal liability concerns in many countries cause a growing number of large audit firms to avoid high-risk clients, which IFAC claims may impede capital formation. IFAC also suggests that increasing litigation costs can reduce public information about companies and make raising capital more difficult. IFAC (1995, 2) argues that litigation against auditors "has the potential to impede the development of capital markets and worldwide business development efforts." These adverse effects of litigation risk were cited in 1992 by the then Big 6 audit firms when arguing for regulatory relief (Cook et al. 1992). Subsequently, a number of changes in U.S. federal law reduced the probability of success and magnitude of auditor liability in private lawsuits against auditors, including the Private Securities Litigation Reform Act of 1995 and the Securities Litigation Uniform Standards Act of 1998 (Geiger and Raghunandan 2002).[5]

We capture the wide variety of legal penalties with a variable that represents expected losses to the auditor if expropriations are not detected by the audit. Similarly, we characterize the wide of variety of insider penalties with a variable that represents expected losses to the insider if expropriations are detected. The crucial difference between our model and previous work on investor protection in different legal jurisdictions is that the probability of detection is endogenous and depends on the incentives of both the insider and the auditor. In addition, we assume that the auditor is in a competitive environment. Therefore, the auditor must be compensated for any expected losses for nondetection, which *ceteris paribus* makes audits relatively more expensive in high penalty jurisdictions, as argued by IFAC above.

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[4] For example, using the La Porta et al. (1997) index of general investor law enforcement, Austria, Finland, Portugal, and Taiwan all rank above average, while they all rank below average on the auditor-specific index reported by Wingate (1997).

[5] Geiger and Raghunandan (2002) present evidence that the changes in the litigation environment were associated with the issuance of fewer going-concern-modified audit opinions to stressed companies, suggesting that auditors' behavior was influenced by the likelihood and possible magnitude of successful litigation. Beatty et al. (2002) consider the effect of the 1995 Private Securities Litigation Reform Act on litigation against IPO firms and the risk premium charged by auditors. They find evidence consistent with a decline in litigation against IPO firms and with either no change or a significant decrease in the litigation risk premium in auditor compensation, suggesting a decline in risk following the Act's passage.

The countervailing implications of higher expected penalties creates a tension in auditor and insider choices that makes the effect of penalties difficult to predict without a formal analysis. For example, if the auditor's behavior were viewed as exogenous, we would expect that greater investor protection in the form of the insider's penalty for detected expropriations would make external investment relatively more desirable. However, if the auditor's choices are endogenous, such a penalty may have the additional effect of decreasing audit resource investment, thereby decreasing the probability of expropriation detection, making external investment relatively less desirable.[6] Similarly, investor protection in the form of a greater penalty for audit failure may increase audit resource investment, thereby making external investment more desirable. However, the insider will find expropriation less profitable and may seek less external investment. In addition, higher audit failure penalties may lead to higher audit costs and fewer insiders seeking an audit or external investment.

SW (2002) develop a model of an entrepreneur (insider) who seeks equity financing for a project. The entrepreneur must decide what proportion of the project's cash flows he is willing to sell. The entrepreneur is able to divert some of the project's cash flow (expropriation) in an environment with limited legal protection of outside investors. SW describe their measure of legal protection as the likelihood that the entrepreneur is caught and assume that this likelihood is exogenously determined. We use SW's basic framework, but we expand the setting to include another economic agent who provides audit services. Thus, the probability that the entrepreneur is caught becomes endogenous in our setting and is influenced by the incentives of both the auditor and the entrepreneur.[7]

Several papers in the audit litigation literature consider the effects of differing legal liability regimes on investor welfare and audit effort. Papers such as Schwartz (1997), Chan and Pae (1998), Radhakrishnan (1999), and Hillegeist (1999) show that legal regimes with higher audit effort do not necessarily correspond to higher investor or social welfare. Schwartz (1997) considers a setting with a firm that seeks to raise capital to expand its operations. The firm may be one of two unknown types (good or bad), and the auditor is hired to reduce uncertainty about the actual type. Schwartz (1997) compares a strict liability penalty regime with a "vague negligence" regime (a setting in which there is uncertainty about the level of due care required to render the auditor blameless). She compares investment levels and audit effort under each of these regimes with the socially optimal levels.

Chan and Pae (1998) compare the effects of a joint and several liability regime with a proportionate liability regime, in a setting in which the firm may be one of two types, good or bad, and current investors wish to sell the firm (for exogenous reasons) to a different set of investors. Again, the auditor is employed to provide information about firm-type. Chan and Pae (1998) show that proportionate liability can decrease audit effort, audit fee, and the market price of the firm, while increasing social welfare.

Radhakrishnan (1999) also compares two liability regimes, due care and strict liability, in a setting in which the firm is one of two types. In Radhakrishnan (1999), the manager's effort influences the probability of the firm-type, thus introducing moral hazard on the part of the manager. However, Radhakrishnan (1999) simplifies the investor's choice of investment to a binary decision, invest an amount K or do not invest. Again the auditor provides information about the firm-type. Radhakrishnan (1999) identifies conditions under which investor welfare is higher given a due care penalty regime. However, audit effort may be higher or lower in a due care penalty regime relative to a strict liability regime.

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[6] Relative to previous studies, the choice of audit resource investment is analogous to the choice of audit effort.

[7] SW consider the entrepreneur's decisions about the size of the project and proportion of the firm to sell and place their setting in a model with many entrepreneurs and many legal jurisdictions to evaluate how the size of capital markets depends on the extent of investor protection in the form of the exogenously specified detection probability. We focus on the interactions between the auditor and entrepreneur and emphasize how the auditor's incentives influence the degree of investor protection and the extent of external investment.

Finally, Hillegeist (1999) considers a setting in which an owner wishes to sell a firm to outside investors. Again, the firm may be one of two types. Hillegeist (1999) introduces a report from the owner, on which the auditor provides an opinion. Hillegeist (1999) compares a joint and several liability regime, a pure proportionate liability rule, and a hybrid proportionate liability rule, and focuses primarily on the rate of audit failures as a measure of investor welfare. The audit failure rate is determined jointly by audit effort and the owner's reporting decision so that both the audit failure rate and audit effort may decrease concurrently.

These papers focus on specific auditor liability regimes in an adverse selection environment where the auditor provides *ex ante* information that helps investors value a firm's prospects. By contrast, we focus on a broader notion of expected penalties due to audit failures, and our setting is one of moral hazard in which the auditor's objective is to detect misappropriations *after* investment has taken place. We consider how auditing, as an element of investor protection, affects capital formation. The insider's expected return increases if he is able to attract larger amounts of investment capital from outsiders, while outside investors' expected return is fixed due to market price protection. Our results show that when the auditor's penalty for undetected expropriation increases, total investment, the insider's welfare, and total surplus increase despite the increase in audit cost. Similarly, when the insider's penalty for detected expropriation increases, total investment again increases, and despite the higher possible penalty, the insider's welfare and total surplus again increase. Thus, increased total investment levels due to increased penalties more than offset any increased cost of those penalties.

The remainder of the paper is organized as follows. Section II contains the model, and Section III contains an analysis of equilibrium strategies. In Section IV, we consider how different penalty regimes affect investment levels, share of the firm sold to outside investors, audit resource investment, levels of resource diversion and audit fees. Section V concludes.

II. MODEL DESCRIPTION

The Shleifer and Wolfenzon (2002) Formulation

We first present a simplified form of SW's model (using our notation) to emphasize where our model departs from their assumptions.[8] SW consider an insider ("entrepreneur" in SW's terminology) who has an investment opportunity that has a known rate of return, g, on the funds invested, I. That is, the investment returns total cash flows of $\Pi = (1 + g)I$. The insider is endowed with wealth, W, that may be invested in the opportunity to which he has the residual rights. In addition, the insider can lever his investment by obtaining external investment capital of I_M in exchange for a λ proportion of these residual rights. The total investment in the firm is then $I_M + W$.[9]

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[8] SW consider an international setting with C countries, each populated by J entrepreneurs. We suppress this notation in our summary of their model.

[9] Again, simplifying SW's formulation, we assume that the insider invests his entire wealth plus all funds raised externally in his investment opportunity.

The insider has incentives to divert or expropriate some of the firm's resources, thus reducing the total payout to the residual claimants.[10] For each investment dollar, the diverting insider bears only $1 - \lambda$ dollar of dividend reduction. SW's insider's payoff is composed of several elements that depend on whether diversion is detected or not. Denote the proportion of resources diverted by δ. If no detection occurs, then the insider expects to receive $\delta\Pi$ in diverted resources and $(1 - \lambda)(1 - \delta)\Pi$ in dividends upon liquidation of the firm (his share of the non-diverted resources). If detection occurs, then the insider must return the diverted resources and thus expects to receive $(1 - \lambda)\Pi$ in dividends. However, he also expects to incur a penalty based on the extent of the diversion, which SW denote $f(\delta)\Pi$. This function is assumed not to vary across countries. That is, the insider penalty function does not represent differential investor protection in SW.

SW characterize investor protection in terms of the probability that the insider's diversion is caught, and they permit this probability to vary across countries. They assume that the detection probability is constant for all firms within a country and does not depend on the ownership structure. Denoting the probability of detection given diversion by q (and the probability of nondetection by $(1 - q)$), the risk-neutral insider's expected payoff can be stated as:

$$EU = \delta\Pi(1 - q) + (1 - \lambda)(1 - \delta)\Pi(1 - q) + (1 - \lambda)\Pi q - f(\delta)\Pi\, q.$$

Rearranging terms and substituting for Π, this expression can be stated as:

$$EU = \{\delta(1 - q) + (1 - \delta(1 - q))(1 - \lambda) - f(\delta)q\}(1 + g)I, \tag{1}$$

where the first term inside the braces is the expected diversion rate, the second is the expected dividend rate, and third is the expected penalty rate.

Investors anticipate diversion by the insider and price shares accordingly. Investors may invest in the insider's opportunity, or they may invest in the market portfolio, which returns an interest rate, i, on their investment. If investors choose the insider's opportunity, they expect to receive $\lambda\Pi$ if the insider is detected (probability q), and $(1 - \delta)\lambda\Pi$ if the insider is not detected (probability $(1 - q)$). Thus, the expected payoff to investors must satisfy the following condition to ensure external investment in the insider's firm:

$$\begin{aligned}(1 + i)I_M &\leq \lambda\Pi q + \lambda\,(1 - \delta)\Pi(1 - q)\\ &= \lambda(1 -(1 - q)\delta)(1 + g)I.\end{aligned} \tag{2}$$

Extension of Shleifer and Wolfenzon's Model to Include an Auditor

We modify SW's model by incorporating a self-interested auditor in the model, thus making the diversion detection probability endogenous. The insider may acquire auditing when he sells a portion of the firm to outsiders.[11] The auditor's task is to detect (and therefore deter) resource diversion. If audit services are acquired, then the insider pays the auditor a fee of F, making the total investment in the firm, $I = I_M + W - F$.[12]

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[10] SW refer to insider expropriation as diversion of resources. We employ these two terms interchangeably.

[11] In an earlier version of this paper, we considered two possible types of insiders, one of which diverted resources and one of which was intrinsically honest, with exogenously given probabilities. None of the qualitative conclusions of our paper were affected by the inclusion of the intrinsically honest type, and for the sake of simplicity and to be consistent with SW, we have dropped this type from the analysis.

[12] We assume that the insider makes a front-end payment to the auditor when issuing securities. This payment represents a type of commitment that ensures auditing will occur before dividends are paid.

Following SW, the insider's expected payoff, given in expression (1), is:

$$EU = \{\delta(1 - q) + (1 - \delta(1 - q))(1 - \lambda) - f(\delta)q\}(1 + g)I.$$

To simplify the analysis, we assume the penalty function is of the form $f(\delta) = b\delta$ where $b > 0$ is an indicator of the severity of the penalty.[13] Thus, the penalty is proportionate to the extent of the diversion,[14] and the insider's expected payoff can be stated as:

$$EU = \{\delta(1 - q) + (1 - \delta(1 - q))(1 - \lambda) - b\delta q\}(1 + g)I. \tag{3}$$

As in SW, investors anticipate the diversion by the insider and price shares accordingly. Thus, the expected payoff to investors must satisfy expression (2) to ensure external investment in the insider's firm. Note that the weak inequality in expression (2) must be a strict equality in equilibrium. A rational insider would never give investors more than is necessary to induce investment.

If the insider hires an auditor, then the auditor's objective is to detect and deter diversion. We assume that the auditor's detection probability depends on the amount of resources, x, invested in the audit, which includes personnel, office staff, and office space. We assume that the cost of these resources is given by:

$$C(x) = \frac{k}{2}x^2 \tag{4}$$

where $C'(x) = kx > 0$ for $x > 0$, $C''(x) = k > 0$, $C(0) = 0$, and $C'(0) = 0$.[15]

The auditor detects diversion with probability:

$$q(x) = 1 - e^{-x}. \tag{5}$$

A detection probability given by the exponential distribution is a common representation in fraud auditing models (e.g., see Newman et al. 1996). As the amount of audit resources approaches 0, the probability of detection approaches 0, and as the amount of audit resources approaches infinity, the probability of detection approaches 1.

Finally, we assume that the auditor incurs an exogenous expected penalty for nondetection of diversion.[16] We assume that the expected penalty is linearly increasing in the diversion rate and denote the penalty by $a\delta$, where a is the penalty multiplier.[17] Thus, given the audit fee, F, the auditor's expected payoff is:

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[13] This penalty is one component of investor protection, where more severe penalties correspond to higher protection countries. The willingness of the legal authority to actually enforce laws is also a component.

[14] SW assume that the insider penalty, $f(\delta)$, is increasing and convex, whereas we have assumed an increasing linear penalty function. A nonlinear penalty function in our model, which also contains nonlinear detection and cost functions, would eliminate any closed-form solutions. However, we have conducted numerical analysis of our comparative statics in Section IV using the function $f(\delta) = b\delta^2$, and all conclusions continue to hold.

[15] Most of our results can be obtained by a more general cost function that is increasing and convex. However, for simplicity of presentation, we adopt the more restrictive quadratic form here.

[16] The insider's and auditor's expected penalties capture the legal environment of each, including the liability rule (joint and several or proportionate), existence of punitive damages, existence of class action suits and contingent attorney fees, and whether unlimited personal liability exists. In our setting, we assume that the expected penalties imposed due to both an audit failure and nondetected diversion are deadweight losses. That is, the penalty does not accrue to the outside investors. This assumption is in contrast to much of the research on auditors' legal liability that considers liability rules in which damages are paid to investors. Of course, we could permit a part of damages to be distributed to investors, providing a certain level of insurance. However, the only consequence would be to ameliorate the agency issues we consider and make external investment more attractive. Our penalty characterizations are deliberately simple to capture the degree of investor protection across the wide range of institutional arrangements found in different countries.

$$EU_A = F - C(x) - (1 - q(x))a\delta. \tag{6}$$

We assume that the auditor operates in a competitive market and normalize the audit industry's expected profit to 0. Thus, the auditor's expected payoff must satisfy:

$$F - C(x) - (1 - q(x))a\delta = 0. \tag{7}$$

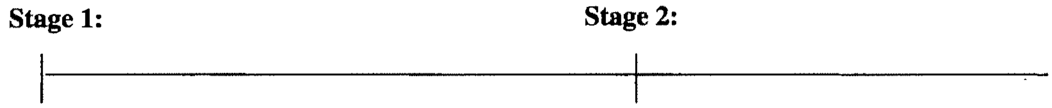
In the first stage of our setting, the insider determines the proportion of the firm to sell, λ, and the total investment, $I_M + W$, in the firm, net of any audit fee, F. In the second stage, the insider selects the amount of firm resources to divert, δ, and the auditor selects the amount of audit resources, x, to expend. The time-line in Figure 1 depicts the sequence of events.

The solution concept for our setting is a subgame-perfect Nash Equilibrium, which requires players' equilibrium strategies to be mutual best responses and form a Nash equilibrium in each subgame (see Fudenberg and Tirole [1995] for a discussion). We identify conditions in Section III for the following equilibrium in which the insider acquires an audit and sells a share of the investment opportunity:

Second stage: Given λ and I, the auditor selects audit resource investment, x, to maximize EU_A, and the insider selects the diversion rate, δ to maximize EU.

First stage: The insider acquires an audit and selects λ to maximize $EU[x^*(\lambda), \delta^*(\lambda)]$ subject to the investors' indifference condition, $(1 + i)I_M = \lambda(1 - (1 - q(x^*))\delta^*)\Pi$, and the auditor's zero-profit condition, $F - C(x^*) - a\delta^* (1 - q(x^*)) = 0$.

FIGURE 1
The Auditor, Insider, and Outside Investors' Choices in Each Stage of the Game



Stage 1:

The insider chooses the proportion of the firm to sell, λ, and total investment, $I_M + W$, net of the audit fee, F.

The outside investors choose their investment amount, I_M.

Stage 2:

The insider chooses the amount of resources to divert, δ.

The auditor chooses the amount of audit resources, x, to expend.

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[17] The audit failure penalty is imposed on the auditor only if the insider's diversion is subsequently discovered, which depends on (unmodeled) random occurrences in later periods. That is, many diversions are discovered by means other than an external audit, while others are never discovered. For this reason, we refer to the auditor's penalty, $a\delta$, as an *expected* penalty.

To eliminate unnecessary notation, we henceforth assume that $i = 0$. The assumption that the market interest rate is equal to 0 is without loss of generality because the only important characteristic of the insider's opportunity is its relative return, g, compared to the market interest rate, i. If $g < i$, then the insider will not pursue the opportunity. Thus, we assume that $g > i$, or, given our simplifying assumption, $g > 0$. Further, to eliminate possible boundary solutions for δ and λ (which are each restricted to the interval [0,1]), we make the following assumptions regarding relative parameter values:

Parameter Assumptions (PA):

1) $k < \bar{k}$, where $\bar{k}$ is given by $\bar{k} = \dfrac{ab}{(1+b)\text{Log}\left(\dfrac{1+b}{b}\right)}$;

2) $W > \underline{W}$, where $\underline{W}$ is given by $\underline{W} = \dfrac{k}{bg}$; and

3) $g < \bar{g}$, where $\bar{g}$ is given by $\bar{g} = \dfrac{a(1+b)}{k} - 1$.

PA (1), which ensures that $\delta < 1$, requires that the cost of auditing not be too large relative to auditor and insider penalties. PA (2) and PA (3) ensure that λ is interior and I is finite. PA (2) requires that the insider's wealth be sufficiently large relative to the cost of auditing, while PA (3) requires that the return from the investment opportunity not be too large. These parameter restrictions are needed due to the specific functional forms used for audit cost, detection technology, and penalty functions. Examples that satisfy these conditions are easy to construct (e.g., see the examples illustrated in Figures 2 and 3).

In the next section, we analyze this setting by considering the second-stage interaction first and then considering the insider's optimal first-stage investment choice and external financing decision based on equilibrium diversion and auditing strategies.

III. EQUILIBRIUM STRATEGIES

Second Stage Equilibrium Strategies

In the second stage of our setting, the insider takes λ and I as given and selects the extent of diversion, δ, to maximize his expected payoff. Similarly, the auditor selects the amount of audit resource investment, x, to maximize his expected payoff. The following proposition gives the interior equilibrium strategies in the second-stage interaction.

Proposition 1: The second-stage Nash equilibrium is in the interior and is given by the auditor's resource investment level, x^*, and the insider's diversion rate, δ^*:

$$1)\; x^* = \text{Log}\left(\frac{\lambda + b}{b}\right), \text{ and} \tag{8}$$

$$2)\; \delta^* = \frac{\lambda + b}{ab} k\text{Log}\left(\frac{\lambda + b}{b}\right). \tag{9}$$

All proofs are in the Appendix.

These strategies represent the usual Nash equilibrium conditions in the second stage interaction. Both are best responses to the strategy of the other player. Thus, the auditor's strategy is dictated by the insider's incentives and *vice versa*.

Given λ and I, the second-stage equilibrium strategies in Proposition 1 determine the required audit fee, F. From the auditor's zero-profit condition (7), we have:

$$F^* = C(x^*) + a\delta^* (1 - q(x^*)).$$

Using our functional assumptions for $C(x)$ and $q(x)$, and the results of Proposition 1, the audit fee can be restated as:

$$F^* = kx^* \left(\frac{x^*}{2} + 1\right). \tag{10}$$

Due to the interaction of the auditor and insider, the audit fee does not depend on the auditor's penalty for nondetection, a, because audit resource investment, x^*, does not depend on the auditor's penalty.

The following lemma, describing the "direct" effects of parameters on strategies in the second stage game while holding I and λ constant, will prove useful in deriving more general results in Section IV.

Lemma 1: In the second-stage interaction between the auditor and insider, holding the proportion of the firm sold to outsiders, λ and the total investment, I, constant:

1) audit resource investment decreases in the insider's penalty for detection and is unaffected by the auditor's penalty for nondetection, and
2) the diversion rate decreases in the insider's penalty for detection and decreases in the auditor's penalty for nondetection.

Of course, Lemma 1 is based on a partial equilibrium analysis. The results parallel several of the conclusions in other strategic auditing analyses that assume an exogenous demand for auditing and exclusively focus on the interaction between an auditor and auditee (e.g., Newman and Noel 1989; Shibano 1990; Newman et al. 1998). This lemma is useful because it allows us to contrast these partial equilibrium outcomes with conclusions from a more complete model that permits external investment levels to be influenced by parameter changes, particularly changes in penalty regimes.

As a result of the second-stage strategies, the insider is indifferent between diverting and not diverting given the auditor's strategy. Proposition 2 gives the insider's resulting expected payoff.

Proposition 2: Based on the equilibrium strategies of the second stage (see Proposition 1), the insider's expected payoff in the first stage is $EU = (1 - \lambda)(1 + g)I$.

Proposition 2 holds because the auditor's strategy makes the insider's expected benefit from diversion (expected undetected diversion amount plus net dividend) equal to the expected cost of diversion (expected penalty due to detection). That is, the auditor deters the insider so that the expected net gain from diversion is zero.

First Stage Analysis

In the first stage of our setting, the insider determines the amount of total investment in his firm, I, and the proportion of the firm's liquidating dividend that is sold to external investors, λ. Using expression (2), the assumption that $i = 0$, and recalling that $I = I_M + W - F$ and $\Pi = (1 + g)I$, we can solve for the amount of total investment in the project:

$$I^* = \frac{W - F^*}{1 - \lambda(1 + g)(1 - \delta^*(1 - q(x^*)))} = \frac{W - F^*}{1 - \lambda(1 + g)\left(1 - \frac{kx^*}{a}\right)}, \tag{11}$$

where F^* is given by expression (10).

The proportion of the firm's dividends sold can be determined from the insider's first-order condition on λ, taking into consideration λ's effect on second stage equilibrium decisions.

By Proposition 2, we express the insider's expected payoff as:

$$EU = (1 - \lambda)(1 + g)I(\lambda). \tag{12}$$

Thus, the insider's first-order condition with respect to λ is:

$$(1 + g)\left((1 - \lambda)\frac{dI}{d\lambda} - I(\lambda)\right) = 0 \tag{13}$$

where:

$$\frac{dI}{d\lambda} = \frac{\partial I}{\partial \lambda} + \frac{\partial I}{\partial x}\frac{\partial x}{\partial \lambda}.$$

While this first-order condition is complex, we can determine the behavior of several choice variables as parameters vary by using the implicit function theorem. These results are described in Section IV.

IV. COMPARATIVE ANALYSIS

In our model, the degree of investor protection is represented by the penalties imposed on the insider if detected and the auditor if the audit fails. Therefore, we are primarily interested in how variations in the penalty regime affect the insider's and auditor's strategic choices, the level of total investment, and the share of the firm sold to outside investors. First, we establish our central results regarding total investment levels and the share of the firm sold.

Proposition 3: Changes in k, a, and b affect the solutions for I and λ as follows:

1) Both total investment level, I, and share of firm sold, λ, decrease as the audit cost parameter, k, increases.
2) Both I and λ increase as the auditor's penalty for nondetection, a, and the insider's penalty for detection, b, increase.

The effects of direct audit cost on total investment and share of the firm sold are intuitive. As the efficiency of the audit (the probability of detection per unit of required audit resources) decreases, an audit becomes an increasingly costly means of controlling insider diversion, and this cost comes with no compensating incentive effects.

By contrast, higher expected auditor penalties for nondetection and higher insider penalties for detected diversion increase expected costs, but they also provide incentives that help control diversion. Thus, in markets that provide greater investor protection through these penalties, total investment levels in new ventures are greater and firm ownership is less concentrated. The countervailing implications that arise from an increase in these penalties, such as the effects on audit fees, audit resource investment, and diversion rates, have the net effect of increasing total investment. Furthermore, the different forms of penalties are complementary. The higher the level of insider penalty, the greater the marginal effect on total investment of increasing the auditor's penalty and *vice versa*. Figure 2 illustrates this relationship.

The following subsections disaggregate the effects of the auditor's and insider's penalties on audit resource investment, the diversion rate, audit fee, and the insider's expected payoff.

Audit Resource Investment

Recall from Lemma 1 in Section III that if total investment level, I, and the share of the firm sold to outsiders, λ, are fixed, then increases in the auditor's penalty for nondetection, a, do not affect audit resource investment, x. By contrast, an increase in the insider's penalty, b, decreases audit resource investment. However, when I and λ are endogenous choices, Proposition 3 shows that a change in either penalty affects total investment levels and the share of the firm sold, which, in turn, affect audit resource investment. The following proposition describes how these penalties affect audit resource investment when total investment and share of the firm sold are endogenous.

Proposition 4: In equilibrium, an increase in the auditor's nondetection penalty, a, or the insider's detection penalty, b, increases audit resource investment, x.

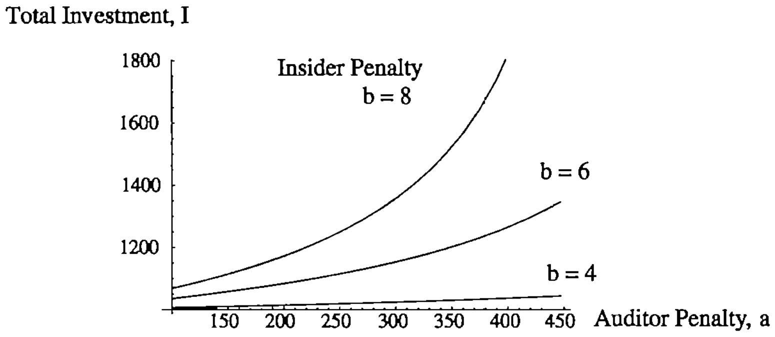
An increase in the insider's detection penalty has a direct decreasing effect on the audit resource investment as reflected in Lemma 1, and an indirect increasing effect through its effect on the share of the firm sold to outsiders. We can express these effects as:

$$\frac{dx}{db} = \frac{\partial x}{\partial b} + \frac{\partial x}{\partial \lambda}\frac{\partial \lambda}{\partial b},$$

where $\frac{\partial x}{\partial b}$ is the direct effect and $\frac{\partial x}{\partial \lambda}\frac{\partial \lambda}{\partial b}$ is the indirect effect. Lemma 1 reveals that the direct effect of the insider's penalty on audit resource investment is negative. However, the insider's penalty increases the share of the firm sold, λ, and audit resource investment increases as the share of the firm sold increases. Hence, the indirect effect is positive, and we show in Proposition 4 that it dominates the direct effect.

Similarly, the direct effect of the auditor's nondetection penalty on audit resource investment is 0 (from Lemma 1). However, the auditor's penalty increases λ, and audit resource investment increases as the share of the firm sold increases.

FIGURE 2
Marginal Effect of Auditor's Penalty on Total Investment as the Insider's Penalty Increases



Parameter values for Figure 2: W = 1000, g = .2, and k = 700.

These results imply that in settings with greater penalties, which have greater levels of total investment and external ownership, the probability of detection of expropriations is greater. That is, audit failure rates are lower. Of course, because total investment levels are greater, when an audit fails, the extent of losses may be greater, particularly if diversion rates also increase. We consider this issue in the next section.

Diversion Rates

Lemma 1 indicates that if total investment level and the share of the firm sold to outsiders are determined exogenously, then increases in the insider's detection penalty decrease the diversion rate, δ. However, external investment levels increase with the detection penalty, which reverses these effects.

Proposition 5: In equilibrium, an increase in the insider's detection penalty, b, increases the diversion rate, δ.

The explanation for this effect is similar to a change in audit resource investment. While the "intuitive" result is given by the negative direct effect, the indirect effect created by the increase in total investment dominates. As a result, diversion rates increase in environments with greater penalties for diversion. Of course, total expected diverted resources also increase because total investment increases. Thus, when audits fail, the losses to external investors are greater.

Similarly, an increase in the auditor's nondetection penalty also has a direct effect on the insider's diversion rate (as reflected in Lemma 1) and an indirect effect through its effect on the share of the firm sold to outsiders. We can express these effects as:

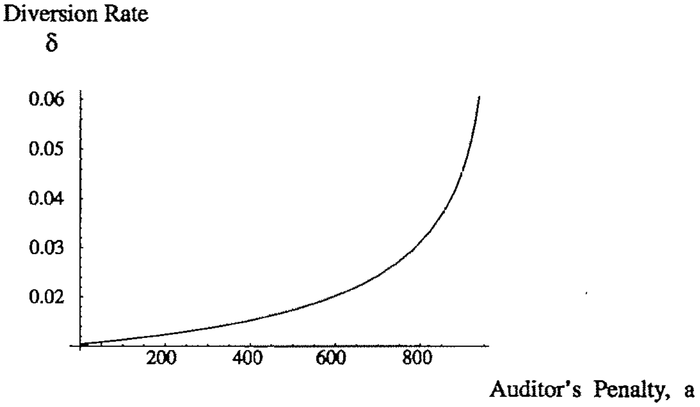
$$\frac{d\delta}{da} = \frac{\partial\delta}{\partial a} + \frac{\partial\delta}{\partial\lambda}\frac{\partial\lambda}{\partial a},$$

where $\frac{\partial \delta}{\partial a}$ is the direct effect and $\frac{\partial \delta}{\partial \lambda}\frac{\partial \lambda}{\partial a}$ is the indirect effect. From Lemma 1, we know the direct effect of an increase in the auditor's penalty is negative—diversion decreases. However, we also know that an increase in the auditor's penalty increases external investment and the available resources to divert. If the indirect effect of increasing external investment and increasing diversion rates is greater than the direct effect, then equilibrium diversion rates increase with the auditor penalty. A numerical analysis shows that the indirect effect dominates and the diversion rate increases in the auditor's penalty (see Figure 3).[18]

Audit Fee and the Insider's Expected Payoff

Because auditor and insider penalty rates affect the level of total investment, audit resource investment, and diversion rates, both types of penalties also affect audit fees. For example, an increase in the auditor's nondetection penalty would, all else held constant, increase the audit fee because in a competitive audit market the fee must compensate the auditor for the higher expected loss. However, in our setting, an increase in such a penalty also increases external investment, which would lead to increased audit resource investment and decreased risk of an audit failure. Direct audit cost, $C(x)$, increases, but expected penalties may decrease, and the net effect on audit fees is not obvious. However, in our setting, both auditor penalty and insider penalty have an unequivocally positive effect on audit fees, as established in Proposition 6. In addition, we find that due to the greater total investment levels associated with our measures of investor protection, the insider has a higher expected payoff as penalties increase.[19]

FIGURE 3
The Insider's Diversion Rate as a Function of the Auditor's Penalty



Parameter values for Figure 3: W = 1000, g = .2, b = 4, and k = 700.

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[18] While we cannot prove that the indirect effect always dominates, we can find no example in which the insider's diversion rate decreases in the auditor's penalty.

[19] Because external investors and the auditor are "price protected" through the investors' indifference condition and the auditor's zero-profit condition, their payoffs are not affected by changes in penalties. Thus, Proposition 6 reveals that an increase in penalties represents a Pareto improvement in our setting.

Proposition 6: In equilibrium, an increase in the auditor's nondetection penalty, a, or the insider's detection penalty, b, increases the level of audit fees and the insider's expected payoff.

Given the auditor's and insider's second stage strategies, the audit fee is given by (see expression (10)): $F^* = kx^*\left(\frac{x^*}{2} + 1\right)$. Therefore, parameters that increase audit resource investment, such as auditor and insider penalties (by Proposition 4), also increase the audit fee. Due to increased total investment levels induced by higher penalties, the insider's expected payoff increases as investor protection increases. Intuitively, increasing penalties in our model increases total investment, and thus the total expected wealth of an economy, enough to make the insider better off. Of course, there are practical limitations on increasing penalties without bound. The linear character of the penalty functions and preferences in our model give rise to the unconditional nature of Proposition 6. If the insider is risk-averse, we would expect to see a natural bound on the level of efficient penalties. Similarly, the possibility of bankruptcy may limit feasible penalties.

V. CONCLUSION

The traditional view of the role of auditing is one of attestation—the auditor provides an opinion on a report prepared by management. By contrast, our approach focuses on auditor activities that detect and prevent unauthorized use of investor funds, an increasingly important audit role given corporate scandals in recent years. Many of these scandals involve insiders diverting corporate resources for their own use, suggesting breakdowns in the institutional mechanisms that protect outside investors.

Investor protection depends critically on the detection and punishment of insider expropriation. We extend investor protection models to focus explicitly on the detection of insider expropriation by self-interested auditors operating in a competitive audit market. Our model of investor protection differs from prior auditing models that consider investment levels in that we examine moral hazard on the part of the insider. The insider first chooses how much of the residual rights to a profitable opportunity to sell and whether to employ an auditor. Subsequently, the insider decides how much (if any) of the assets to expropriate, and the auditor chooses the level of investigative resource investment.

We find that increases in the auditor's penalty for undetected expropriation lead to total investment increases, and the insider is made better off despite the increase in audit cost. Similarly, increases in the insider's penalty for detected expropriation again result in total investment increases, and despite the higher possible penalty, the insider again reaps a net benefit. Thus, we find that increased total investment levels due to increased penalties more than offset any increased cost of those penalties.

The empirical implications of our model derive from the comparative analyses of Section IV. For example, following our results, countries with higher auditor penalties and insider penalties, each representing a component of overall investor protection, are predicted (*ceteris paribus*) to have higher total investment levels and more dispersed ownership. In addition, the relationship between the penalties is complementary—higher auditor penalties lead to a greater marginal effect of increasing insider penalties and *vice versa*. In addition, audit fees are predicted to be higher in higher penalty countries. We also find that audit resource investment is greater in environments with greater auditor or insider penalties. Therefore, the likelihood of an audit failure in such environments is lower. However, expected total resources diverted are also larger in high-penalty regimes, so an audit failure leads to greater expected loss to external investors. The insider's expected payoff is higher in higher-penalty regimes because of the net positive impact such penalties have on total investment levels.

Of course, we have a very austere characterization of penalty regimes, both for the auditor and insider. In their empirical test of investor protection predictions, La Porta et al. (1998) partition countries into three broad categories of investor protection: common-law, French-civil-law, and German- and Scandinavian-civil-law countries. To test our predictions, perhaps a similar coarse classification scheme (e.g., based on the audit risk rating reported in Wingate [1997]) could be used to order auditor penalties. In addition, we demonstrate the need to control for audit failure penalties when considering the effect of diversion penalties and *vice versa.*

Our analysis has a number of limitations. We focus exclusively on investor protection represented by expected insider penalties for detected expropriation and expected auditor penalties for audit failures. We ignore the possibility that detection may arise from other sources, such as disgruntled employees, law enforcement agencies, or suspicious external investors. We do not consider systematic differences in the willingness of social institutions to enforce laws. We also ignore other sources of investor protection, such as corporate governance mechanisms. We assume that the auditor operates in a competitive market. If the audit market is not competitive, our results may not hold. We ignore institutional requirements that may be imposed on auditors (e.g., "generally accepted auditing standards") and that constrain the auditor's ability to offer audits of the scale desired by the insider. Because a two-stage, three-player model becomes rather complex, we made a number of simplifying assumptions, particularly about the auditor's detection technology and cost function and the nature of penalties for both the auditor and insider. Other formulations may lead to more ambiguous results.

Despite these limitations, our model and results provide an extension to the analysis of investor protection. We explicitly consider the role of auditing and the auditor as an economic agent in capital investment and ownership dispersion. In addition, we show the possibility of an unequivocally positive economic role of (legal and reputational) penalties for audit failures in terms of audit fees and expected payoffs.

APPENDIX

Proof of Proposition 1

From expressions (3) and (5) we obtain the insider's expected payoff:

$$EU = \{\delta \mathrm{Exp}(-x) + (1 - \delta \mathrm{Exp}(-x))(1 - \lambda) - \delta\,(1 - \mathrm{Exp}\,(-x))b\}(1 + g)I. \tag{A1}$$

As a result, the insider's first-order condition is:

$$\frac{\partial EU}{\partial \delta} = \{\mathrm{Exp}(-x) - \mathrm{Exp}\,(-x)(1 - \lambda) - (1 - \mathrm{Exp}(-\,x))b\}(1 + g)I = 0, \tag{A2}$$

which implies that the auditor chooses x^* such that:

$$\operatorname{Exp}(-x^*) = \frac{b}{\lambda + b} \text{ and} \tag{A3}$$

$$x^* = \operatorname{Log}\left(\frac{\lambda + b}{b}\right). \tag{A4}$$

From expressions (4), (5), and (6), we obtain the auditor's first-order condition:

$$\frac{\partial EU_A}{\partial x} = -kx + \operatorname{Exp}(-x)a\delta = 0, \tag{A5}$$

which implies that the insider's diversion rate satisfies:

$$\delta^* = \frac{kx^*}{a\operatorname{Exp}(-x^*)} = \frac{(\lambda + b)}{ab}k\operatorname{Log}\left(\frac{\lambda + b}{b}\right).$$

Assumption PA (1) ensures that $\delta < 1$ for all possible values of λ.

Proof of Lemma 1

Based on the results of Proposition 1 we know that:

$$x^* = \operatorname{Log}\left(\frac{\lambda + b}{b}\right) \text{ and}$$

$$\delta^* = \frac{(\lambda + b)}{ab}k\operatorname{Log}\left(\frac{\lambda + b}{b}\right).$$

Therefore:

$$\frac{dx^*}{da} = 0, \frac{dx^*}{db} = -\frac{\lambda}{b(b + \lambda)} < 0,$$

$$\frac{d\delta^*}{db} = -\frac{k\lambda}{ab^2}\left(1 + \operatorname{Log}\left(\frac{\lambda + b}{b}\right)\right) < 0, \text{ and}$$

$$\frac{d\delta^*}{da} = -\frac{k(b + \lambda)}{a^2 b}\operatorname{Log}\left(\frac{\lambda + b}{b}\right) < 0.$$

Proof of Proposition 2

From the insider's expected payoff function (A1) and the solution for x^* given in (A4), we have:

$$\begin{aligned}EU &= \left\{\delta\left(\frac{b}{\lambda + b}\right) + \left(1 - \delta\left(\frac{b}{\lambda + b}\right)\right)(1 - \lambda) - \delta\left(\frac{\lambda}{\lambda + b}\right)b\right\}(1 + g)I \\ &= \left\{\delta\left(\frac{b}{\lambda + b}\right) + (1 - \lambda) - \delta\left(\frac{b}{\lambda + b}\right) + \lambda\delta\left(\frac{b}{\lambda + b}\right)\right. \\ &\quad \left. - \delta\left(\frac{\lambda}{\lambda + b}\right)b\right\}(1 + g)I \\ &= (1 - \lambda)(1 + g)I.\end{aligned}$$

Proof of Proposition 3

***Proof that* λ *decreases in* k $\left(\frac{d\lambda}{dk} < 0\right)$ *and increases in* a *and* b $\left(\frac{d\lambda}{da} > 0\right.$ *and* $\left.\frac{d\lambda}{db} > 0\right)$.**

The insider's objective function is:

$$\max_{\lambda} EU = (1 - \lambda)(1 + g)I(\lambda),$$

with corresponding first-order condition:

$$\frac{\partial EU}{\partial \lambda} = -(1 + g)I + (1 - \lambda)(1 + g)\frac{dI}{d\lambda} = 0 \tag{A6}$$

where $\frac{dI}{d\lambda} = \frac{\partial I}{\partial \lambda} + \frac{\partial I}{\partial x}\frac{\partial x}{\partial \lambda}$.

$$\text{Expression (A6) implies that } (1 - \lambda)\frac{dI}{d\lambda} - I = 0. \tag{A7}$$

Recall from expression (11) that total investment, I, is (suppressing asterisks):

$$I = \frac{W - F(x)}{1 - \lambda(1 + g)\left(1 - \frac{kx}{a}\right)}.$$

Define $D = 1 - \lambda(1 + g)\left(1 - \frac{kx}{a}\right) > 0$ (D is for "denominator").

Consider the terms $\frac{\partial I}{\partial \lambda}$, $\frac{\partial I}{\partial x}$, and $\frac{\partial x}{\partial \lambda}$ in $\frac{dI}{d\lambda}$:

$$\frac{\partial I}{\partial \lambda} = \frac{-\dfrac{\partial F(x)}{\partial \lambda} D - \dfrac{\partial D}{\partial \lambda}(W - F(x))}{D^2}$$

$$= \frac{(1 + g)\left[1 - \dfrac{kx}{a}\right](W - F(x))}{D^2} \tag{A8}$$

because $F(x)$ does not directly depend on λ.

$$\frac{\partial x}{\partial \lambda} = \frac{1}{\lambda + b} \tag{A9}$$

$$\frac{\partial I}{\partial x} = \frac{-F'(x)D - \dfrac{\partial D}{\partial x}(W - F(x))}{D^2}$$

$$= \frac{-(F'(x))D - \left[\lambda(1 + g)\left(\dfrac{k}{a}\right)\right](W - F(x))}{D^2}, \tag{A10}$$

where $F'(x) = kx + k$ (A11)

and $F(x) = k\dfrac{x^2}{2} + kx.$ (A12)

Substituting (A8), (A9), and (A10) into (A7) gives:

$$(1 - \lambda)\left\{\frac{(1 + g)\left[1 - \dfrac{kx}{a}\right](W - F(x))}{D^2} - \left(\frac{1}{\lambda + b}\right)\frac{F'(x)D + \left[\lambda(1 + g)\left(\dfrac{k}{a}\right)\right](W - F(x))}{D^2}\right\}$$
$$- \frac{(W - F(x))}{D} = 0. \tag{A13}$$

Simplifying (A13) yields:[20]

$$g - k\frac{(1 + g)}{a}\left[x + \frac{(1 - \lambda)\lambda}{\lambda + b}\right]$$
$$- \left(\frac{1 - \lambda}{\lambda + b}\right)\left(\frac{F'(x)}{(W - F(x))}\right)\left(1 - \lambda(1 + g)\left(1 - \frac{kx}{a}\right)\right) = 0. \tag{A14}$$

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[20] Details of this simplification can be obtained from the authors upon request.

Denote the simplified first-order condition in (A14) as $H(\lambda)$. Assumptions PA (2) and PA (3) ensure that $\lambda \in (0,1)$ and that I is finite and positive.

Applying the implicit function theorem to $H(\lambda)$ allows $\frac{d\lambda}{dk}, \frac{d\lambda}{da}$, and $\frac{d\lambda}{db}$ to be signed.

$$\frac{d\lambda}{dk} = -\frac{\frac{\partial H}{\partial k}}{\frac{\partial H}{\partial \lambda}}.$$

$\frac{\partial H}{\partial \lambda}$ is the insider's second-order condition, and therefore, in equilibrium, $\frac{\partial H}{\partial \lambda} < 0$.

$$\begin{aligned}\frac{\partial H}{\partial k} = &-\frac{(1+g)}{a}\left[x + \frac{(1-\lambda)\lambda}{\lambda + b}\right] \\ &- \left(\frac{1-\lambda}{\lambda + b}\right)\left(\frac{W(1+x)}{(W - F(x))^2}\right)\left(1 - \lambda(1+g)\left(1 - \frac{kx}{a}\right)\right) \\ &- \left(\frac{1-\lambda}{\lambda + b}\right)\left(\frac{F'(x)}{(W - F(x))}\right)\lambda(1+g)\frac{x}{a} < 0.\end{aligned}$$

Thus, $\frac{d\lambda}{dk} < 0$.

To sign $\frac{d\lambda}{da}$, consider $\frac{d\lambda}{da} = -\frac{\frac{\partial H}{\partial a}}{\frac{\partial H}{\partial \lambda}}$.

$$\begin{aligned}\frac{\partial H}{\partial a} = &\; k\frac{(1+g)}{a^2}\left[x + \frac{(1-\lambda)\lambda}{\lambda + b}\right] \\ &+ \left(\frac{1-\lambda}{\lambda + b}\right)\left(\frac{F'(x)}{(W - F(x))}\right)\left(\lambda(1+g)\left[\frac{kx}{a^2}\right]\right) > 0.\end{aligned}$$

Therefore $\frac{d\lambda}{da} > 0$.

To sign $\frac{d\lambda}{db}$, consider $\frac{d\lambda}{db} = -\frac{\frac{\partial H}{\partial b}}{\frac{\partial H}{\partial \lambda}}$.

Note that $\frac{\partial x}{\partial b} = -\frac{\lambda}{(\lambda + b)b} < 0$ and that $1 - \lambda(1+g)\left(1 - \frac{kx}{a}\right) > 0$ by assumption.

$$\begin{aligned}\frac{\partial H}{\partial b} = &-\frac{(1+g)}{a}k\left[\frac{\partial x}{\partial b} - \frac{(1-\lambda)\lambda}{(\lambda+b)^2}\right]\\ &+\left(\frac{1-\lambda}{(\lambda+b)^2}\right)\left(\frac{F'(x)}{(W-F(x))}\right)\left(1-\lambda(1+g)\left(1-\frac{kx}{a}\right)\right)\\ &-\left(\frac{1-\lambda}{\lambda+b}\right)\left(\frac{\left(k\frac{\partial x}{\partial b}\right)}{(W-F(x))}\right)\left(1-\lambda(1+g)\left(1-\frac{kx}{a}\right)\right)\\ &-\left(\frac{1-\lambda}{\lambda+b}\right)\left(\frac{F'(x)}{W-F(x)}\right)^2\frac{\partial x}{\partial b}\left(1-\lambda(1+g)\left(1-\frac{kx}{a}\right)\right)\\ &-\left(\frac{1-\lambda}{\lambda+b}\right)\left(\frac{F'(x)}{(W-F(x))}\right)\left(\lambda(1+g)\left(\frac{k}{a}\frac{\partial x}{\partial b}\right)\right) > 0.\end{aligned}$$

Therefore $\frac{d\lambda}{db} > 0$.

Proof that I decreases in k $\left(\frac{dI}{dk} < 0\right)$ ***and increases in a and b*** $\left(\frac{dI}{da} > 0\right.$ **and** $\left.\frac{dI}{db} > 0\right)$.

As before, $I = \frac{W - F(x)}{D}$.

$$\frac{dI}{dk} = \frac{dI}{d\lambda}\frac{d\lambda}{dk} + \frac{\partial I}{\partial k}$$

From Expression (A7) we know that $\frac{dI}{d\lambda} > 0$ in equilibrium. From the proof above, we know: $\frac{d\lambda}{dk} < 0$. Finally, $\frac{\partial I}{\partial k} = \frac{-x\left(\frac{x}{2}+1\right)D - \lambda(1+g)\frac{x}{a}(W - F(x))}{D^2} < 0$.

Therefore, $\frac{dI}{dk} < 0$.

$$\frac{dI}{da} = \frac{dI}{d\lambda}\frac{d\lambda}{da} + \frac{\partial I}{\partial a}.$$

We have $\frac{dI}{d\lambda} > 0$, $\frac{d\lambda}{da} > 0$, and $\frac{\partial I}{\partial a} = \frac{W - F(x)}{D^2}\frac{kx\lambda(1+g)}{a^2} > 0$.

Therefore, $\frac{dI}{da} > 0$.

$$\frac{dI}{db} = \frac{dI}{d\lambda}\frac{d\lambda}{db} + \frac{\partial I}{\partial b}$$

We have $\frac{dI}{d\lambda} > 0$, $\frac{d\lambda}{db} > 0$, and

$$\frac{\partial I}{\partial b} = -\frac{F'(x)}{D}\frac{\partial x}{\partial b} - \frac{(W - F(x))}{D^2}\frac{\lambda(1 + g)k}{a}\frac{\partial x}{\partial b} > 0.$$

Therefore, $\frac{dI}{db} > 0$.

Lemma 2 $\frac{d\lambda}{db}\frac{b}{\lambda} > 1$.

The proofs of several propositions depend on the result of Lemma 2. Lemma 2 is true because $\frac{\partial H}{\partial b}\frac{b}{\lambda} > -\frac{\partial H}{\partial \lambda}$. Details proving that this inequality holds can be obtained from the authors upon request.

Proof of Proposition 4

Proof that audit resource investment increases in the auditor's penalty, a.

$$x = \text{Log}\left(\frac{\lambda + b}{b}\right).$$

$$\frac{dx}{da} = \frac{\partial x}{\partial a} + \frac{\partial x}{\partial \lambda}\frac{d\lambda}{da} \quad \text{where} \quad \frac{\partial x}{\partial a} = 0 \quad \text{and} \quad \frac{\partial x}{\partial \lambda} = \frac{1}{\lambda + b}.$$

Thus, $\frac{dx}{da} > 0$ because Proposition 3 shows that $\frac{d\lambda}{da} > 0$.

Proof that audit resource investment increases in the insider's penalty, b.

$$\frac{dx}{db} = \frac{\partial x}{\partial b} + \frac{\partial x}{\partial \lambda}\frac{d\lambda}{db} \quad \text{where} \quad \frac{\partial x}{\partial b} = -\frac{\lambda}{(\lambda + b)b} \quad \text{and} \quad \frac{\partial x}{\partial \lambda} = \frac{1}{\lambda + b}.$$

Thus, $\frac{dx}{db} > 0$, if and only if $\frac{d\lambda}{db} > \frac{\lambda}{b}$, or $\frac{d\lambda}{db}\frac{b}{\lambda} > 1$.

Based on Lemma 2, $\frac{dx}{db} > 0$.

Proof of Proposition 5

From expressions (8) and (9), $\delta^* = \frac{kx(\lambda + b)}{ab}$.

$$\begin{aligned}\frac{d\delta}{db} &= \frac{kx}{ab} - \frac{(\lambda + b)kx}{ab^2} + \frac{(\lambda + b)k}{ab}\frac{\partial x}{\partial b} + \frac{1}{ab}kx\frac{d\lambda}{db} + \frac{(\lambda + b)k}{ab}\frac{\partial x}{\partial \lambda}\frac{d\lambda}{db}\\ &= \frac{kx}{ab} - \frac{(\lambda + b)kx}{ab^2} + \frac{(\lambda + b)k}{ab}\frac{\partial x}{\partial b} + \frac{k}{ab}\frac{d\lambda}{db}(x + 1)\\ &= \frac{k}{ab}\left\{x - \frac{(\lambda + b)x}{b} - \frac{\lambda}{b} + \frac{d\lambda}{db}(x + 1)\right\}\\ &= \frac{k}{ab}(x + 1)\left(\frac{d\lambda}{db} - \frac{\lambda}{b}\right).\end{aligned}$$

So $\frac{d\delta}{db} > 0$ when $\left(\frac{d\lambda}{db} - \frac{\lambda}{b}\right) > 0 \Leftrightarrow \frac{d\lambda}{db}\frac{b}{\lambda} > 1$, which is true due to Lemma 2. Therefore, $\frac{d\delta}{db} > 0$.

Proof of Proposition 6

From Expression (10) the audit fee is:

$$F = k\frac{x^2}{2} + kx \quad \text{and} \quad \frac{\partial F}{\partial x} = kx + k > 0.$$

Thus, any parameter that increases x increases audit fees. We know from Proposition 4 that increases in penalties a and b increase x.

From Proposition 2, the insider's payoff is:

$$EU = (1 - \lambda)(1 + g)I$$

Consider the effects of a change in the auditor's penalty, a:

$$\frac{dEU}{da} = \frac{\partial EU}{\partial a} + \left(\frac{\partial EU}{\partial \lambda} + \frac{\partial EU}{\partial x}\frac{\partial x}{\partial \lambda}\right)\frac{\partial \lambda}{\partial a}.$$

By the insider's first-order condition, $\left(\frac{\partial EU}{\partial \lambda} + \frac{\partial EU}{\partial x}\frac{\partial x}{\partial \lambda}\right) = 0$. Thus, we have

$$\frac{dEU}{da} = \frac{\partial EU}{\partial a} = (1 - \lambda)(1 + g)\frac{\partial I}{\partial a} > 0$$

where from the proof of Proposition 3, $\frac{\partial I}{\partial a} > 0$.

Consider the effects of a change in the insider's penalty, b:

$$\frac{dEU}{db} = \frac{\partial EU}{\partial b} + \frac{\partial EU}{\partial x}\frac{\partial x}{\partial b} + \left(\frac{\partial EU}{\partial \lambda} + \frac{\partial EU}{\partial x}\frac{\partial x}{\partial \lambda}\right)\frac{\partial \lambda}{\partial b}.$$

By the insider's first-order condition, $\left(\frac{\partial EU}{\partial \lambda} + \frac{\partial EU}{\partial x}\frac{\partial x}{\partial \lambda}\right) = 0$.

Thus, $\frac{dEU}{db} = (1 - \lambda)(1 + g)\left(\frac{\partial I}{\partial b} + \frac{\partial I}{\partial x}\frac{dx}{db}\right) > 0$ because from Proposition 3 we showed that $\frac{\partial I}{\partial b} + \frac{\partial I}{\partial x}\frac{dx}{db} = \frac{\partial I}{\partial x}\frac{dx}{db} > 0$.

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 315–348

Quantifying the Costs of Intertemporal Taxable Income Shifting: Theory and Evidence from the Property-Casualty Insurance Industry

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ABSTRACT: This paper presents a model of optimal tax-motivated intertemporal income shifting given a quadratic cost function that relates the costs associated with shifting income to the amount of income shifted. By formally modeling the income-shifting decision, we: (1) show how parameter estimates of the income-shifting cost function can be extracted from a linear regression where a proxy for income shifted is the dependent variable, (2) provide insight into prior tax-motivated income-shifting research, and (3) clarify the interpretation of independent variables that capture the interaction between tax incentives and nontax costs. We then provide an empirical application of our method for quantifying the costs to shift federal taxable income by investigating the income-shifting behavior of firms in the property and casualty (P&C) insurance industry following the Tax Reform Act of 1986. Our results suggest that the parameters of the cost function are negatively related to firm size, the cost to shift a significant amount of income is nontrivial, and the marginal cost to shift income increases as more income is shifted.

Keywords: *intertemporal income shifting; tax-motivated income shifting, nontax costs; efficient tax planning.*

Data Availability: *Data are available from sources identified in the paper.*

This paper has evolved significantly because of the constructive comments and suggestions of Charlene Henderson, William R. Kinney, D. Craig Nichols, Shelley Rhoades-Catanach, Tom Stober, Rick Tubbs, Jim Wahlen, Matt Wieland, two anonymous reviewers, and workshop participants at Indiana University, The University of Iowa, University of Notre Dame, The University of Texas, and at the 2001 American Accounting Association Annual Meeting. Professor Randolph acknowledges the financial support from the University of Dayton School of Business Administration. Professor Seida acknowledges the financial support from the Mendoza College of Business.

Editor's note: This paper was accepted by Terry Shevlin, Senior Editor.

Submitted January 2003
Accepted May 2004

I. INTRODUCTION

Efficient tax planning requires the consideration of tax benefits and the aggregate (nontax) costs of obtaining those benefits (Scholes and Wolfson 1992). In essence management must, whether explicitly or implicitly, estimate the relation between the aggregate costs (from all possible sources) that arise from shifting taxable income and the amount shifted to determine the optimal amount of income to shift. Prior empirical research investigating firms' coordination (or trade-off) of tax and nontax incentives examines associations between tax decisions and proxies for various sources of costs to establish the existence or nonexistence of each source's influence on a particular tax decision.[1] Shackelford and Shevlin (2001, 326) review the trade-off literature and state that quantification of the costs that impede tax minimization has progressed slowly and that future research should estimate and quantify exchange rates between taxes and other considerations (Shackelford and Shevlin 2001, 342).[2] This paper presents a method for quantifying the total and marginal costs of shifting taxable income across periods.

The method begins with a conceptual model of a manager's decision to shift income across time. Since we expect the marginal cost of income shifting to increase as more income is shifted, the aggregate cost of income shifting is modeled as a quadratic function of the amount of income shifted. The model reveals that the parameters of the quadratic cost function are reflected in the outcome of the income-shifting decision in a manner that allows the parameters to be empirically estimated. It is important to note that this paper does not focus on identifying alternative sources of income-shifting costs; rather the focus is on quantifying the (perceived) aggregate cost of income shifting. The formal model of the income-shifting decision is a critical part of our incremental contribution. The model (1) shows how estimates of the parameters of the income-shifting cost function can be extracted from linear regression coefficients, (2) clarifies the interpretation of some main effect variable coefficients in prior tax-motivated income-shifting research, and (3) clarifies the interpretation of interaction variable coefficients in income-shifting research, a subject debated in the prior literature (see Shackelford and Shevlin 2001, 370–371; Maydew 2001, 400).

We apply our method of quantifying the costs of shifting federal taxable income to firms in the property and casualty (P&C) insurance industry. Our sample period (1986–1992) exploits provisions of the Tax Reform Act of 1986 (TRA86), which provided some P&C firms with relatively large tax incentives to shift federal taxable income in some years. Including years with relatively large differences in marginal tax benefits from the cross-time shifting of income enhances the precision of our income-shifting cost estimates because such differences should induce a greater range in the amount of income shifted. We initially pool data from all sample firms into a single regression to extract parameter estimates of the linear and quadratic terms of the aggregate income-shifting cost function. Our cost function parameter estimates suggest that the cost of shifting nontrivial amounts of income into the future is relatively large and that the marginal cost of shifting income increases as the amount shifted increases (i.e., the cost function's quadratic parameter is positive). For example, pooling across all firm-year observations, our estimates imply that the averaged-sized firm in our sample ($685m accident-year loss reserve) would incur a total cost of at least $0.552m to shift $30m of income from the current period into future periods and that the marginal cost to shift another dollar would be $0.036.[3] We also find that the cost to shift a given amount of income is inversely related to firm size (e.g., if the loss reserve account is $200m, then the estimated total cost to shift $30m is $1.892m and the marginal cost to shift another dollar is $0.124).

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[1] Prior studies examine financial reporting costs (e.g., Guenther 1994; Maydew 1997), agency costs (e.g., Balsam and Ryan 1996; Shevlin 1987), and regulatory costs (e.g., Scholes et al. 1990; Collins et al. 1995; Beatty et al. 1995) as factors that impede tax-motivated income shifting.

[2] Examples of research that attempt to quantify costs include Engel et al. (1999) and Erickson et al. (2004). Engel et al. (1999) state that firms were willing to incur costs of between \$10m and \$43m for a 12.8 percent improvement in their debt to asset ratio on average. Erickson et al. (2004) estimate that firms are willing to pay between \$0.03 and \$0.19 (\$0.11 point estimate) in federal taxes per dollar of fraudulent accounting earnings.

Prior research that examines factors affecting the cost of income shifting has implicitly assumed that firms' cost functions differ due to differences in firm-specific circumstances, such as differences in the costs associated with reporting lower income. We partition our firm-year observations into two groups based on insurance company ratings adjusted in some cases for current year financial reporting constraints. We expect the sensitivity of nontax costs to reductions in currently reported annual income will differ across the two groups and estimate the income-shifting cost function parameters for each group. We find that the total and marginal costs of deferring income for firms whose nontax costs are expected to be more sensitive to reductions in current-period reported earnings are more than twice as large as the total and marginal costs of income shifting for the other firms in our sample. In particular, we estimate that an (averaged-sized) firm whose nontax costs are more (less) sensitive to the delayed recognition of income would incur total nontax costs of approximately $1.172m ($0.467m) to shift $30 million of income from the current period into future periods and that the marginal cost of shifting another dollar would be approximately $0.076 ($0.031).

The remainder of this paper proceeds as follows. The next section proposes a quadratic income-shifting cost function and integrates this cost function into a model that quantifies the optimal amount of income to shift into the future given the tax benefit of delayed income recognition. Section III provides some institutional detail about P&C firms and explains how TRA86's transitional provisions affected P&C firms. Section IV describes the sample selection process, provides operational definitions of our variables, and presents the regression models we use in the empirical analysis and their relation to the models developed in section two. Section V presents the results of the empirical investigation and related estimates of the costs to shift income. Section VI concludes.

II. INCOME-SHIFTING DECISION MODEL AND COST FUNCTION ESTIMATION METHOD

In this section, we develop three versions of a model in which a decision maker balances the tax benefits of deferring income against the costs of such an action. In the basic model, we allow individual firms to have different income-shifting cost function coefficients, but our analysis does not emphasize such differences. We then adapt the basic model to encompass the income-shifting decisions of two firm groups with different cost function parameters and discuss the interpretation of main effect and interaction variable coefficients in such settings. Finally, we adapt the model to allow cost function parameters to depend upon a measure of firm size. This adaptation assumes that the cost of shifting a given amount of taxable income, say $1m, is less for a P&C firm that has a loss reserve of $100m than for a P&C firm that has a loss reserve of $10m. The assumption is implemented by making the parameters in the quadratic cost function inversely related to a measure of firm size, which is consistent with the use of a scaled income-shifting variable in most prior research. In each adaptation of the model, we explain how the cost function parameters can be extracted from a linear regression whose specification follows directly from the model of optimal cross-time income shifting.

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[3] As discussed in detail later, P&C firms can shift taxable income via a relatively low-cost income-shifting mechanism: the loss reserve account. For our sample firms, taxable income shifting in the amount of $30 million represents an amount approximately equal to 15 percent ($30m/$192m) of mean pre-shift taxable income, but only 4.4 percent of the mean unmanaged accident-year loss reserve amount ($30m/$685m).

The Basic Income-Shifting Model

The model assumes that the amount of income shifted for tax and financial accounting purposes is the same (i.e., strict conformity exists between tax and financial accounting). We denote the dollars of income shifted by firm *i* from current period *t* into future periods as ds_{it} and the marginal tax benefit per dollar to firm *i* from shifting income from current period *t* into future periods as mtb_{it} (assumed to be constant for firm *i* within a year regardless of the amount of dollars shifted). The definition of mtb_{it} implies that the total tax benefit (i.e., $ds_{it} \cdot mtb_{it}$) from shifting income is proportional to the number of dollars shifted.

Given that the total tax benefit is proportional to the dollars shifted, a nonlinear cost function (in terms of ds_{it}) is necessary if there is to be a meaningful balancing of tax and nontax costs in the tax planning decision. Optimal tax shifting in the presence of a linear cost function would result in either all income shifted into the future if the slope of the linear cost function is less than mtb_{it} or no income shifted if the slope is greater than mtb_{it}. We choose to model a quadratic cost function because it is a relatively simple function that has the property that the marginal cost of income shifting increases as more income is shifted. This property is prevalent in prior literature. Scholes et al. (1990) assume that commercial banks face quadratic cost functions as they seek to balance tax, regulatory, and financial reporting objectives. Beatty et al. (1995) model a cost function with quadratic terms in their analysis of how banks minimize total tax and nontax costs by simultaneously choosing the level of individual financial items (e.g., loan loss provisions) that have the potential to impact regulatory capital, earnings and taxable income. Hunt et al. (1996) incorporate a quadratic cost function in their examination of how LIFO firms manage interacting accounting measures to meet multiple objectives. Similarly, Maydew (1997, 87) states that "the net incentive to shift is positive only over a certain range of income, beyond which the costs of shifting exceed the benefits." This statement is consistent with firms facing increasing marginal costs, which is a characteristic of a quadratic cost function.

We model the aggregate cost of shifting income (C_{it}) into the future as the following quadratic function of the dollars shifted:

$$C_{it} = l_{it} ds_{it} + q_{it} ds_{it}^2, \tag{1}$$

where l_{it} is the parameter associated with ds_{it} (hereafter, the linear parameter) and q_{it} is the parameter associated with ds_{it} squared (hereafter, the quadratic parameter). We assume that the signs of l_{it} and q_{it} are positive, which implies that both total and marginal costs are positive and increasing as more dollars are shifted.[4]

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[4] The model developed here is also applicable to the case when the consideration of tax and nontax incentives results in shifting income into—rather than out of—the current period (i.e., negative *ds* in Equation (1) above). In such a case the decision maker is balancing tax costs against nontax benefits and we would expect a quadratic nontax benefit function to reflect that the benefit of shifting income into the current period increases at a decreasing rate. Scholes et al. (1990, 643), for example, note that for commercial banks regulatory costs are "decreasing, but at a decreasing rate, with increases in regulatory capital." Modeling the tax/nontax trade-off for firms that liquidate LIFO inventory layer(s) may yield insights on the proposition that (and the degree to which) the benefits to shifting income into the current period increase at a decreasing rate.

The forces captured by this aggregate cost function require some additional discussion. Current performance indicators become less favorable as taxable income is shifted into the future because, as mentioned earlier, we assume such shifting has the same effect on both tax and financial accounting income. For example, current net income, rate of return on beginning assets, and the debt-to-equity ratio all become less favorable as income is shifted into future periods. The changes in all such variables combine to impose real and/or perceived costs on the firm. Equation (1) assumes that management distills all such influences on its income-shifting decision into the firm- and time-specific cost function parameters, l_{it} and q_{it}, so that l_{it}, q_{it}, and the amount of dollars shifted (ds_{it}) captures all the costs of shifting income into the future.[5] Because l_{it} and q_{it} capture the costliness of nontax factors from the delayed recognition of income, one would expect the parameters, l_{it} and q_{it} to be higher for firms with higher pre-shift debt ratios, lower pre-shift profitability, etc. Notice, however, that while l_{it} and q_{it} imbed a firm's pre-shift values for profitability, leverage, etc., l_{it} and q_{it} are independent of the amount of dollars shifted. In essence, the firm- and time-specific parameters, l_{it} and q_{it}, capture the cost consequences of the changes in the leverage ratio, profitability, etc. induced by shifting income and such consequences depend upon the pre-shift values of firm-specific performance indicators.

The net benefit of shifting income into the future (NB_{it}) is captured by the following equation:

$$NB_{it} = mtb_{it}ds_{it} - (l_{it}ds_{it} + q_{it}ds_{it}^2). \tag{2}$$

The optimal value for ds_{it}, labeled ds^*_{it}, is that value of ds_{it} that makes the first derivative of Equation (2) with respect to ds_{it} equal to zero. This value is:

$$\begin{aligned} ds^*_{it} &= \{1/(2q_{it})\}mtb_{it} - \{(1/(2q_{it}))l_{it}\} \\ &= (mtb_{it} - l_{it})/(2q_{it}). \end{aligned} \tag{3}$$

Shackelford and Shevlin (2001, 327) state that nontax and tax considerations "are not independent and that neither consistently dominates the other in decision making." The second line of Equation (3) illustrates this interdependence. First, if the linear parameter in the firm's cost function (l_{it}) is greater than or equal to the marginal tax benefit (mtb_{it}), then nontax factors will preclude tax reduction through income shifting. Second, even if nontax factors do not preclude the reduction of taxes through income shifting (i.e., $l_{it} < mtb_{it}$), such factors will influence the degree to which firms engage in tax-motivated income shifting. Specifically, as the quadratic parameter of the firm's cost function (q_{it}) increases, the optimal amount of income to shift decreases (and approaches zero as q_{it} becomes large).

Equation (3) captures the basic model of cross-time income shifting and relates the optimal amount of cross-time income shifting to the firm- and time-specific cost function parameters and the marginal tax benefit per dollar of income shifted. The first line of Equation (3) can be viewed as a linear regression (without an error term) of ds^*_{it} on mtb_{it} and a vector of ones. The regression coefficients (shown within $\{\cdot\}$) in the first line of Equation (3)) are algebraically related to the linear and quadratic term parameters in the firms' cost functions. For example, the regression coefficient on mtb_{it} in Equation (3) is equal to one-half of the reciprocal of the cost function's quadratic parameter. So, in theory, estimates of the cost function parameters can be *extracted* from a linear regression like that represented in Equation (3) and these cost function parameter estimates imply the amount of incremental costs incurred by a firm when it optimally responds to tax incentives. Next, we present two extensions of the basic model with the intent of providing insight into some issues raised in prior income-shifting research and to ease the transition from the theory imbedded in Equation (3) to our empirical application.

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[5] Conceptually, an aggregate cost function is required to objectively model efficient tax planning.

Extension One: Two Classes of Quadratic Cost Functions

Assume that firms can be divided into two groups that differ in the sensitivity of their nontax costs to a reduction in current earnings. We denote a firm as either type a or b and distinguish the cost function parameters of these two firm types by *a* and *b* subscripts, respectively. In particular, the cost function of a type a firm is:

$$C_{it} = l_a ds_{it} + q_a ds_{it}^2. \tag{4}$$

The cost function of a type b firm is:

$$C_{it} = l_b ds_{it} + q_b ds_{it}^2. \tag{5}$$

Substituting from Equation (4) and Equation (5) into Equation (3) gives the following separate relations between ds^*_{it} and mtb_{it} for a and b firms, respectively:

$$ds^*_{it} = \{1/(2q_a)\}mtb_{it} - \{(1/(2q_a))l_a\}, \tag{6a}$$

$$ds^*_{it} = \{1/(2q_b)\}mtb_{it} - \{(1/(2q_b))l_b\}. \tag{6b}$$

In essence, the optimal amount of dollars to shift from the current period into the future is a linear function of the marginal tax benefit per dollar shifted for both types of firms, but a and b firms are allowed to have regression coefficients that differ in both slope and intercept.

Now consider a sample that contains both a and b firms and let cf_ind_{it} be a cost function indicator variable that is 0 for type a firms and 1 for type b firms in period *t*. The following model captures the relation between the optimal dollars shifted and the marginal tax benefit of doing so for both firm types:

$$\begin{aligned} ds^*_{it} = {} & \{1/(2q_a)\}mtb_{it} - l_a/(2q_a) + \{½\,(1/q_b - 1/q_a)\}mtb_{it}\cdot cf\_ind_{it} \\ & + \{½\,[(l_a/q_a) - (l_b/q_b)]\}cf\_ind_{it}. \end{aligned} \tag{7}$$

Note that Equation (7) is a linear regression (without an error term).

Equation (7) provides insight on two key issues. First, there is a disagreement in the literature about how to infer the existence of trade-offs between tax and nontax factors from a regression-based analysis. Equation (7) provides a basis for understanding both sides of this disagreement.[6] Shackelford and Shevlin (2001, 370–371) argue that a nonzero coefficient on the interaction between a proxy for nontax costs and a tax benefit variable is required to document a trade-off between tax and nontax factors. They contend that significant coefficients on main effect variables alone are not evidence of trade-offs between tax and nontax influences. On the other hand, Maydew (2001, 400) does not believe that a significant interaction term coefficient is necessary to document the existence of trade-offs. Equations (6a) and (6b) indicate that all firms (i.e., a and b firms) trade off costs and tax benefits in reaching an optimal income-shifting decision. The regression implied by Equation (7) makes clear that the coefficient of the interaction term will be zero (nonzero) if the parameters of the quadratic term in the cost functions for a and b firms are the same (different). In theory, a nonzero coefficient means that firms in the two classes have different quadratic parameters in their cost function, which implies that their marginal costs to shift another dollar are different and the nature of their trade-off between tax and nontax factors is different. Technically, this means that a nonzero regression coefficient is not a necessary condition to establish the existence of trade-offs between tax and nontax costs; a nonzero coefficient indicates that the trade-offs *differ* across firms that differ in the level of the nontax cost proxy. On the other hand, a zero coefficient on the interaction term would suggest that firms with different levels of a cost proxy (say leverage) have marginal cost functions with the same slope. Similarity in marginal costs generally does not make sense if the proxy is a valid measure of income-shifting cost sensitivity. Thus, we would generally expect significant interaction term coefficients between tax benefits and a nontax cost proxy if the proxy is a valid measure of management's perceptions of the influences of income shifting on costs.

Second, Equation (7) reveals that the coefficient of the main effect indicator variable (cf_ind_{it}) is a function of the linear and quadratic term parameters of both type a and b firms and that the sign of this coefficient depends on the relative sizes of l_a, l_b, q_a, and q_b. This complexity makes directional predictions for this coefficient difficult; examples can be constructed that demonstrate the coefficient on cf_ind_{it} can be either positive or negative.[7] However, prior income-shifting research generally makes directional predictions on nontax cost variables. For example, Maydew (1997, 92) uses leverage as a "proxy for the expected cost of violating bond covenants" in the context of a cross-time income-shifting study and predicts that the coefficient will be negative, presumably because high leverage firms have higher costs (i.e., higher leverage reduces the extent to which firms are willing to reduce current earnings).[8]

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[6] In the following discussion, it is convenient to view Equation (7) as applying to a context in which nontax costs arise from only one source and to assume cf_ind_{it} differentiates firms based on the sensitivity of their nontax costs to the amount of income shifted into the future from this source.

[7] The coefficient estimate of cf_ind_{it} in Equation (7) can be re-arranged as $\{½(l_a q_b - l_b q_a)/q_a q_b\}$. Consider as case 1 a sample composed of two types of firms with $l_a = 0.0250$, $q_a = 0.03$, $l_b = 0.03$, and $q_b = 0.035$ and as case 2 a sample composed of two types of firms with $l_a = 0.0275$, $q_a = 0.03$, $l_b = 0.03$, and $q_b = 0.035$ (i.e., the only difference relative to case 1 is the linear parameter of the cost function). Consider both cases as differentiating firms in the sample on the basis of an all-inclusive cost proxy (perhaps high-leverage versus low-leverage firms). In both cases 1 and 2, type b firms have cost functions with higher linear and quadratic term coefficients than that for type a firms. Intuitively, this means that the cost to shift income is higher for type b firms than for type a firms. Notice, however, that in case 1 the coefficient of the main effect cost function indicator variable would be negative (−0.012), while in case 2 the coefficient of the cost function indicator variable would be positive (0.030).

Extension Two: Scaled Cost Function Coefficients

Consider a firm- and time-specific "cost sensitivity" variable (denoted s_{it}) that differentiates both the linear and quadratic term parameters in an otherwise common quadratic cost function. In our application s_{it} is a measure of size because we assume that it is easier (less costly) for firms with large balances in discretionary accounts to delay the recognition of income than it is for firms with small balances in discretionary accounts. Under these circumstances the quadratic cost function of all firm-years can be represented as:

$$C_{it} = (l/s_{it})ds_{it} + (q/s_{it})ds_{it}^2. \tag{8}$$

Firms, in this representation of the cost function, are presumed to have a common element in their linear and quadratic parameters (l and q, respectively) but larger firms, as measured by s_{it}, have proportionally smaller linear and quadratic parameters.

The cost function in Equation (8) means that the net benefit of shifting income into the future (NB_{it}) is captured in the following equation:

$$NB_{it} = mtb_{it}ds_{it} - [(l/s_{it})ds_{it} + (q/s_{it})ds_{it}^2]. \tag{9}$$

The optimal value for ds_{it}, labeled ds^*_{it}, is that value of ds_{it} that makes the first derivative of Equation (9) with respect to ds_{it} equal to zero. This value is:

$$ds^*_{it} = (1/(2q))mtb_{it}\cdot s_{it} - (l/(2q)). \tag{10}$$

Dividing both sides of Equation (10) by s_{it} gives:

$$ds^*_{it}/s_{it} = (1/(2q))mtb_{it} - (l/(2q))/s_{it} = (1/(2q))(mtb_{it} - l/s_{it}). \tag{11}$$

The first line of Equation (11) describes a linear regression with a deflated measure of the optimal dollars shifted as the dependent variable and with the marginal tax benefit and the reciprocal of the size or scaling measure as independent variables. The scaled dependent variable in Equation (11) may be better behaved in empirical application than the unscaled variable ds^*_{it} which is the dependent variable in Equations (3) and (7). We note that prior studies of income management in the P&C industry (e.g., Petroni 1992; Petroni et al. 2000)—the setting of our empirical application—use a scaled variable to measure income management. Additionally, findings in Scholes et al. (1992) and Guenther (1994) that tax-motivated income shifting is more prevalent in larger firms implies that the costs to shift are likely lower for larger firms. The second line of Equation (11) shows that mtb_{it} must be larger than l/s_{it} in order to induce the delayed recognition of income.

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[8] Maydew (1997) uses two different income-shifting measures: operating income and nonrecurring items. When the dependent variable is operating income shifted, the sign on the coefficient estimate for leverage is in the direction predicted (t = 3.06). However, when the dependent variable is nonrecurring items shifted the sign on the coefficient estimate for leverage is opposite the direction predicted (t = 1.10). Guenther (1994) examines expected current accruals by calendar-year firms for each of the four year years 1985–1988. For the one year that his regression model is statistically significant (i.e., 1986), the sign on the coefficient estimate for leverage is in the direction predicted (t = 3.19). Given the design of Maydew (1997), the negative and significant coefficient estimate on the leverage variable when operating income shifted is the dependent variable implies that all sample observations, both control firms (which have a time-value-of-money incentive to increase the loss) and treatment firms (which have both tax-rate and time-value-of-money incentives to increase the loss), are sensitive to leverage-related costs and therefore trade-off tax and nontax considerations. Since an interaction term is not included it is not possible to determine if the nature of the trade-off differs due to increased leverage. Guenther (1994) cannot utilize an interaction term because within each main analysis (i.e., Tables 2 and 3) firms' tax incentives to shift taxable income do not vary.

The above size-scaled model can also be modified to incorporate the cost function indicator variable introduced in Equation (7); the model is:

$$ds^*_{it}/s_{it} = \{1/(2q_a)\}mtb_{it} - \{l_a/(2q_a)\}s_{it}^{-1} + \{\tfrac{1}{2}\,(1/q_b - 1/q_a)\}mtb_{it}\cdot cf\_ind_{it} \\ + \{\tfrac{1}{2}\,[(l_a/q_a) - (l_b\,/q_b)]\}cf\_ind_{it}\cdot s_{it}^{-1}. \tag{12}$$

As with Equation (7), Equation (12) can be interpreted as a linear regression with a size-scaled income-shifted dependent variable, no intercept, and independent variables consisting of: s_{it}^{-1}, mtb_{it}, $cf\_ind\cdot s_{it}^{-1}$, and $mtb_{it}\cdot cf\_ind_{it}$ (coefficients, in terms of cost function parameters, are in $\{\cdot\}$).

The transition from a theoretical model to empirical application requires the making of several decisions. Equations (7), (11), and (12) assume the existence of aggregate income-shifting cost functions that are similar across firms. The models represented by Equations (7) and (12) assume that all firms have a quadratic cost function and that two classes of firms exist that differ only in the values of their linear and quadratic term cost function parameters (after controlling for size in the scaled models).

We investigate firms' costs of cross-time income shifting within the P&C insurance industry during a period that includes the years in which TRA86 provided an extra incentive to shift taxable income into the future. Focusing on a single industry rather than a broad sample of firms should provide better estimates of cost function parameters because the within-industry sample firms likely face more homogeneous costs than would a sample comprised of firms across diverse industries. Further, focusing on years that include the implementation of TRA86 leads to greater variation in the tax incentive variable than in stable tax rate periods and should allow more precise estimation of the cost function parameters.

III. P&C FIRMS' LOSS RESERVE ACCOUNT AND THE EFFECT OF TRA86 ON P&C FIRMS

This section first provides institutional detail about how P&C firms account for claim payments and the liability for unpaid claims, for both financial reporting and federal income tax purposes. It then discusses two changes made by TRA86 that substantially increased P&C firms' incentive to defer federal taxable income for 1986 and 1987—the tax rate reductions and the transition to loss reserve discounting.

P&C Firms' Expense for Insured Losses

Prior research (e.g., Petroni 1992; Petroni et al. 2000; Nelson 2000) exploits the unique nature of the P&C industry's liability for unpaid claim losses—commonly called the "loss reserve"—as an alternative to examining earnings management via unexpected accruals, which Guay et al. (1996, 104) conclude are estimated with considerable imprecision. These P&C insurance industry studies examine whether errors in initially established loss reserves are associated with variables that proxy for nontax (e.g., regulatory) and tax concerns. Both Petroni (1992) and Nelson (2000) find that firms with tighter regulatory constraints have smaller reserve overstatements (i.e., shift smaller amounts of income from the current period to future periods) than less constrained firms. However, Petroni (1992), Petroni et al. (2000), and Nelson (2000) fail to provide consistent evidence that that the loss reserve overstatements of tax-paying P&C firms are significantly greater than those of nontax-paying P&C firms. The inability of these studies to find evidence of a tax effect could possibly be due to the fact that none of the studies exploited tax incentives arising from statutory tax law changes. It is important to note that these studies were aimed at finding how various nontax and tax factors influence loss reserve errors and they did not attempt to determine parameters of an aggregate nontax cost function, which is the purpose of our study.

We follow prior studies of income management in the P&C industry by focusing on the loss reserve account. The loss reserve is an attractive account to examine because of its magnitude (loss reserves generally account for over 40 percent of total P&C firm liabilities), because P&C firms must reconcile the reported loss reserve with subsequent cash realizations (thereby providing an observable imperfect measure of managerial discretion; see Petroni 1992, 486), and because it is a relatively low-cost mechanism for shifting taxable income.[9]

At any balance sheet date, a P&C firm's *total* loss reserve represents the estimate of future payments necessary to settle *all* outstanding claims. P&C firms track outstanding claims and link each claim to the particular year in which the insurance covering the loss event was written by categorizing loss reserves according to so-called "accident-years." An *accident-year* loss reserve reflects management's estimate of future payments necessary to settle the claims arising from covered loss events *occurring in that particular year.* The *total* loss reserve at any balance sheet date represents outstanding claims related to new insurance coverage written during the current accident-year, as well as outstanding claims relating to insurance coverage written in *all prior* accident-years.[10] Thus, the *total* loss reserve account represents the sum of all *accident-year* loss reserves that have nonzero balances.

A P&C firm initially establishes its estimate of losses for a particular accident-year by the end of that year. In each subsequent year, the insurer reduces the loss reserve for claims paid and adjusts, if necessary, its estimate for each accident-year to account for the remaining claims attributable to loss events covered by insurance written during that accident-year. These adjustments (representing changes in estimated losses) affect net income in the period in which the adjustment is made. An increase (decrease) in a prior accident-year reserve—adjusted for claims already paid—is commonly called reserve strengthening (weakening). For financial reporting purposes, the required current-year expense for loss reserves is the initial amount of that accident-year's loss reserve plus (minus) the so-called strengthening (weakening) in all prior accident-year loss reserves. For tax reporting purposes, the allowable current-year deduction for loss reserves is the initial amount of that accident-year's *discounted* loss reserve plus (minus) the strengthening (weakening) in all prior accident-year *discounted* loss reserves.[11] Knowing with certainty that the loss reserve account similarly impacts both financial and taxable income mitigates the concerns about measurement error that exist with accrual models that construct observable financial accounting measures to proxy for unobservable tax measures of interest.

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[9] The loss reserve represents management's estimate of expected claim losses. Consequently, using the loss reserve account to shift taxable income requires neither the cooperation of a party external to the P&C firm nor a near-term commitment of cash, an exception to the general tax rule—i.e., the *economic performance* rule in IRC §461(h)—that requires liabilities be satisfied before the associated expense can be claimed as a tax deduction.

[10] For example, assume that at an insurer writes insurance coverage during calendar years 2001, 2002, and 2003, exclusively, and that at the end of calendar year 2003 there are outstanding claims relating to insurance coverage written during each of those years. The *total* loss reserve reported for calendar 2003 would be comprised of the outstanding claims relating to loss events covered by insurance written during the current year (i.e., the *2003 accident-year* loss reserve) and the outstanding claims relating to loss events covered by insurance written in each of the prior years (i.e., the *2002 accident-year* loss reserve and the *2001 accident-year* loss reserve).

[11] The loss reserve discounting requirement was instituted by TRA86 and is discussed in more detail below.

Corporate Tax-Rate Reductions

P&C firms, like all corporations, were subject to a five-step graduated tax rate structure with a top corporate tax rate of 46 percent on taxable income over $100,000 before TRA86. TRA86 lowered the maximum corporate tax rate from 46 percent to 34 percent, effective for taxable years beginning on or after July 1, 1987. Firms with tax years that did not end on June 30, 1987 (like the calendar-year P&C firms we investigate) were taxed at a "blended" tax rate for the transitional year that included July 1, 1987. Calendar-year firms subject to the maximum statutory tax rate received a six-percentage point tax rate reduction in both 1987 (from 46 to 40 percent) and 1988 (from 40 to 34 percent). Thus, calendar-year firms could minimize the present value of federal taxes by shifting taxable income from 1986 to 1987 (or some other future year) and/or from 1987 to 1988 (or some other future year).

Loss Reserve Discounting and the Fresh-Start Adjustment

Prior to TRA86, P&C firms' loss reserve deductions were based on the undiscounted sum of expected payments for claim losses (i.e., strict conformity between tax and financial accounting existed for the loss reserve account). Under the provisions of TRA86 (beginning in 1987), the basis for computing the loss reserve deduction is the *discounted* loss reserve. The post-1986 allowable current-year deduction for loss reserves is the initial amount of that accident-year's *discounted* loss reserve plus (minus) the strengthening (weakening) in all prior accident-year *discounted* loss reserves. TRA86 facilitated the implementation of the new discounting rules with a transitional provision for a "fresh-start" adjustment to the discounted loss reserve required as of the beginning of the 1987 tax year. The fresh-start adjustment was equal to the difference between undiscounted loss reserves as of December 31, 1986 and the amount of discounted loss reserves as of January 1, 1987. In essence, the fresh-start adjustment allowed P&C firms to determine their 1987 deduction for claim losses as if only the present value of the beginning loss reserve had been deducted in prior years when, in fact, the full undiscounted value of the beginning loss reserve was deducted in prior years. This transitional provision meant that the difference between the undiscounted and discounted loss reserve (as of January 1, 1987) was deducted twice—first when the undiscounted reserve was established during a pre-1987 year and a second time in 1987 via the discounting of the January 1, 1987 loss reserve.[12]

Congress recognized that the fresh-start adjustment provided P&C firms with an incentive to intentionally overstate the level of loss reserves recorded in 1986 and gave the IRS authority to prevent abuses (99th Cong., 2d Sess. II-367 1986). Specifically, TRA86 provided that a firm's allowable fresh-start benefit could not include "reserve strengthening." While it was clear that Congressional intent was to prohibit insurers from seeking fresh-start tax benefits on intentionally overstated loss reserves, TRA86 failed to statutorily define reserve strengthening and left open the possibility that P&C firms would manage the loss reserve account in order to increase fresh-start tax savings.[13] The facts in the United States Supreme Court case *Atlantic Mutual Insurance Company v. Commissioner of Internal Revenue Service* (*81 AFTR 2d 98-1566*, 118 S Ct 1413 (S Ct, 4/21/98)) indicate that at least one P&C firm did indeed seek fresh-start benefit on increases to reserves recorded in 1986.[14]

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[12] The double deduction that stems from the fresh-start adjustment is most easily illustrated with an example, which is provided in Appendix A.

The fresh-start tax benefit provided P&C firms an incentive to increase loss reserve estimates at the end of 1986 even if the tax rates in 1986 and 1987 would have been identical. The effective deduction over 1986–87 for each additional dollar of 1986 loss reserves is:

$$\$1 \cdot [1 + (1 - \text{loss reserve discount ratio})]. \tag{13}$$

The loss reserve discount ratio is the present value of the loss reserve balance divided by the undiscounted loss reserve balance. If the loss reserve discount ratio is 85 percent,[15] then the total deduction in 1986–87 because of an additional dollar of loss reserves in 1986 is $1.15. A $1.00 deduction occurs in 1986 due to the 1986 loss reserve addition and the fresh-start adjustment causes 1987 deductions to be $0.15 higher (due to the discounting of the additional dollar of 1986 loss reserves). That is, for each "extra" dollar of loss reserves recorded in 1986, P&C firms could obtain permanent tax savings by effectively increasing 1987 tax deductions by $1 multiplied by (1 − the loss reserve discount ratio). Given a loss reserve discount ratio of 85 percent and a 40 percent tax rate (the top statutory tax rate for 1987), the fresh-start adjustment means that each "extra" dollar of loss reserves recorded in 1986 would reduce a (tax-paying) firm's 1987 tax liability by $0.06 [$1.00(1 − 85%)·40%]. The fresh start provides a potential tax savings for all P&C firms, including those with tax net operating loss (NOL) carryforwards. However, the tax savings for NOL firms was deferred until the firm pays regular U.S. income tax.

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[13] TRA86's failure to define "reserve strengthening" enhances the likelihood that insurers seeking fresh-start tax benefits on intentionally overstated loss reserves would have chosen to manage the *initial* loss reserve related to new (1986) accident-year insurance coverage rather than adjustments to the loss reserves already established for prior accident-years because no estimate had been previously recorded for the 1986 accident-year and thus there existed no benchmark against which the IRS could compare the 1986 accident-year loss reserve (i.e., in contrast to an upward revision to a pre-1986 accident-year reserve, the IRS could not mechanically define any portion of the 1986 accident-year reserve as "reserve strengthening"). As discussed in section four, our operational measure of income-shifting is the error in the *initial* accident-year-specific loss reserve estimate for accident-years 1986 through 1992.

[14] At issue in *Atlantic Mutual Insurance Company v. Commissioner of Internal Revenue Service* was the definition of "reserve strengthening." In 1998 the U.S. Supreme Court ultimately resolved that reserve strengthening should be defined for tax purposes as any increase in pre-86 accident-year loss reserves, as prescribed in 1991 by Treasury Regulation §1.846 (proposed May 2, 1991; issued in final form September 4, 1992). Thus, the fresh-start adjustment ultimately provided no tax incentive for overestimating the corrections to loss reserves associated with pre-86 accident-years. The definition of reserve strengthening as it relates to the 1986 accident-year (the measure on which our income-shifting variable is based) was not at issue in *Atlantic Mutual* and to our knowledge has not been addressed by the courts.

[15] Loss reserve discount ratios for P&C firms are determined under IRC §846(c) and are published annually in a Revenue Ruling. The Revenue Ruling provides discount ratios for various lines of insurance and a composite discount ratio. The ratios are based on industry loss payment patterns and interest rates. For purposes of this illustration and our empirical application we use a sample-wide loss discount ratio of 85 percent. The mean composite discount ratio over the 1986–1992 period is 82.75 percent. P&C firms would typically apply the insurance-line specific loss discount ratio and some lines have discount factors that exceed 90 percent. In our empirical application changes to the loss discount ratio affect our proxy for the marginal tax benefits from shifting. The results are similar to those presented if we use discount ratios of 80 percent, 82.75 percent, or 90 percent.

IV. SAMPLE SELECTION CRITERIA AND VARIABLE DEFINITIONS

Estimating the regression models developed in section two requires an appropriate set of sample observations and operational definitions of the theoretical constructs dollars of income shifted (ds^*_{it}), marginal tax benefit (mtb_{it}), cost function indicator (cf_ind_{it}), and the size deflator (s_{it}). The first part of this section describes our sample selection criteria and the second part provides the operational definitions of the variables. Part three presents the regression models.

Sample Selection Criteria

The final sample for our analysis consists of 254 firm-year observations from 39 P&C firms over the years 1986–1992.[16] The initial sample consists of 44 publicly traded P&C firms. Forty-two are from the 49 firms studied by Petroni et al. (2000).[17] Two publicly traded P&C firms not studied by Petroni et al. (2000) that meet our data requirements are included in the initial sample. Seven firms studied by Petroni et al. (2000) do not have the necessary loss reserve development data and are excluded from our sample. If data were available for each year for each firm, then there would be a total of 308 firm-year observations [44 firms × 7 years]. Thus, a total of 54 firm-year observations are lost due to sample screens.

Table 1 indicates that 16 firm-year observations are eliminated because the data necessary to compute the loss reserve error were not available. Most of these observations are lost because another company acquires the firm later in the sample period and our calculation of the loss reserve error requires data thru year $t+5$. All observations for Allmerica Co. and NorthEast are eliminated (seven for each firm) because necessary financial statement data are not available to determine tax status. All observations for AllCity, CNA Financial, and Guaranty National are lost because they are included in the consolidated tax return of another entity. It is unclear what tax incentives these firms face because we cannot observe the tax-sharing agreements that exist between the P&C firms and the other firms that comprise the consolidated group. The 1991 and 1992 observations for Orion are eliminated because Orion filed for bankruptcy protection under Chapter 11 in 1991. One observation was eliminated from the analysis because it was identified as an outlier observation.[18]

Operational Definitions of the Variables

Operational Definition of the Optimal Amount of Income to Shift and Size Deflator

The error in the initial loss reserve estimate, denoted $ResErr\$_{it}$, for each accident-year 1986 through 1992 is the operational measure of the optimal amount of income to shift (ds^*_{it}). This means that corrections to prior accident-year reserve estimates are not part of our annual income-shifting measure (i.e., our measure excludes reserve strengthening). P&C firms that desired to capture tax savings via the fresh-start adjustment, as well as other tax benefits associated with shifting income, are likely to have focused on the loss reserve related to new (i.e., accident-year specific) insurance coverage because, relative to prior

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[16] Since P&C firms' 1992 loss reserve estimates were likely affected by losses due to Hurricane Andrew, we also repeated our analysis without including data for 1992. The results (not tabulated) are similar to those reported.

[17] The 49 firms studied by Petroni et al. (2000) are a subset of the "comprehensive sample of 63 publicly traded property-casualty insurers from 1985–1991 described in Anthony and Petroni (1997)." The firms that Petroni et al. (2000) exclude are excluded from our sample for the same reason: data limitations.

[18] Cincinnati Financial had a loss reserve error that was three standard deviations away from the average loss reserve error of other taxpaying P&C firms in 1986. The analyses with this observation included are qualitatively similar to those reported and only causes a slight change in the implied cost estimates.

TABLE 1
Sample Screens

This table reconciles the potential sample firm-year observations to the final sample firm-year observations. Initial sample firms are identified from Petroni et al. (2000). Sample includes publicly traded P&C firms that are not a subsidiary of another entity.

Potential firm-year observations between 1986–1992 (44 firms × 7 years)	308
Firm-year observations with missing data to compute loss reserve error	(16)
	292
Firms with inadequate financial statement availability	
Allmerica	(7)
NorthEast	(7)
	278
Firms included in the consolidated tax return of another entity	
AllCity	(7)
CNA Financial	(7)
Guaranty National	(7)
	257
Chap. 11 Bankruptcy filing by Orion in 1991 (delete 1991–92)	(2)
	255
Outlier observation: Cincinnati Financial Corporation in 1986	(1)
Total sample observations	254

accident-years, less loss development data exists and there is less objective evidence to curtail management's discretion.

We measure the loss reserve estimation error as the difference between the original accident year-specific loss reserve estimate and the accident-year-specific loss reserve re-estimated five years later, computed as:

$$ResErr\$_{it} = OrigRes_{it} - RevRes_{it}, \tag{14}$$

where $OrigRes_{it}$ is firm i's loss reserve estimate for accident-year t made during calendar year t, and $RevRes_{it}$ is firm i's revised loss estimate for accident-year t made during calendar year $t+5$. This measure is a reasonable proxy for the actual difference between subsequent claim loss realizations and the original estimate of those losses because most claims are settled and paid within the five-year period (Petroni 1992, 490). Positive (negative) values for $ResErr\$_{it}$ indicate over- (under-) statements that reduced (increased) reported earnings relative to that with no error.[19] The loss reserve development disclosures (reported in P&C firms' 10-K filings) provide revised loss reserve estimates based on the claim loss realizations to date (i.e., *ex post* results).[20] The differences between the realized claim losses and the original loss reserve estimates provide observable measures of managerial discretion (Petroni 1992, 486).

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[19] Gaver and Paterson (1999) examine loss reserves, net capital gains, and net stock transactions decisions of P&C firms to determine the extent to which these decisions are influenced by solvency and tax reporting goals. Gaver and Paterson (1999) is fundamentally different from other P&C research in that it investigates the year-to-year changes in the reserve account (reserve estimates for incurred but not reported losses), whereas the other research (e.g., Petroni 1992; Petroni et al. 2000) investigates the loss reserve estimation error. Gaver and Paterson (1999) use data from the 1990–95 period and find evidence that loss reserve changes are related to tax status.

[20] Refer to the illustration provided in Petroni et al. (2000, 120) for an example of how to calculate loss reserve estimation errors.

To control for size effects, most prior empirical studies of earnings manipulation in the P&C insurance industry (e.g., Petroni 1992; Petroni et al. 2000) use the error in the current accident-year loss reserve deflated by the original loss reserve as their dependent variable. To estimate the coefficients in the operational versions of Equations (11) and (12), we also use a scaled loss reserve measure (denoted $ResErr\%_{it}$), but we define it as follows:

$$ResErr\%_{it} = ResErr\$_{it}/RevRes_{it}. \tag{15}$$

We use the revised reserve amount (*RevRes*) instead of the original reserve amount as the deflator so that the discretionary variable (dollars shifted) affects only the numerator and not the denominator of our dependent variable in our empirical application of Equations (11) and (12). Thus, $RevRes_{it}$ is our operational measure of the size-based scaling variable s_{it}.[21]

Operational Definition of the Marginal Tax Benefit from Shifting Income

Our operational measure of the marginal tax benefit from shifting income, denoted *MTB*, is the year-end present value of tax savings associated with using the accident-year-specific loss reserve account to defer a dollar of financial accounting income (thus reducing taxable income by $1 multiplied by the loss reserve discount factor) from the current period (the deferral period) to some future period (the reversal period). This present value per dollar for the firms in our sample takes on values in the interval [0.0000, 0.1846]. Table 2 summarizes the possible values of *MTB* (from highest to lowest) and shows the number of

TABLE 2
Tax Incentive Variable (*MTB*) Coding

This table summarizes the number of firm-year observations at each level of *MTB* and explains the characteristics of the firm-year for each level of *MTB*.

MTB	# Obs.	Criteria
0.1846	14	1986 firm-year observations that paid federal income taxes in 1986.
0.0823	28	1987 firm-year observations that paid federal income taxes in 1987.
0.0556	13	1986 firm-year observations that did not pay federal tax in 1986 (due to the presence of NOLs) but that paid federal tax in 1987. These firms benefited from the fresh-start adjustment.
0.0437	5	1986 firm-year observations that did not pay federal tax in 1986 and 1987 (due to the presence of NOLs) but that paid federal tax in 1988. These firms benefited from the fresh-start adjustment.
0.0313	149	1988–1992 firm-year observations that paid federal income taxes in the specified year.
0.0126	13	1988–1992 firm-year observations that did not pay the federal regular income tax (due to the presence of NOLs) during the specified year but paid the federal AMT during the specified year.
0.0000	32	Non-federal-taxpaying firm-year observations (due to the presence of NOLs).

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[21] The inferences from the regression models using original reserve as the deflator are similar to those reported.

observations that fall into each group. A detailed explanation of our *MTB* calculations and underlying assumptions is provided in Appendix B.

Operational Definition of the Cost Function Indicator Variable

We classify firm-year observations into two groups based on an adjusted A.M. Best Company, Inc. (1986–93) rating reported for year *t* and denote our operational measure of this cost function indicator variable as Cf_Ind_{it}. A.M. Best Company, Inc. (Best) assigns a rating from a high of A++ down to a low of D to insurance companies that are not under ratings suspension, in liquidation or under regulatory supervision. The Best ratings are based upon (A.M. Best Company, Inc. 2002, 1) "a comprehensive and qualitative evaluation of a company's balance sheet, strength, operating performance, and business profile." [22]

We assign each firm-year into one of two groups based on their *adjusted* Best ratings for year *t*. In particular, we adjust the actual Best rating for firm *i* in year *t* downward in either of two cases. First, if a firm's Best rating in year $t+1$ is lower than its rating in year *t*, we use the rating for year $t+1$ as its adjusted Best rating for year *t*. This adjustment is intended to move some firm-year observations characterized by deteriorating financial strength to the category in which delayed income recognition is more costly. Second, we adjust the actual Best rating down one level when it is likely that firm managers would consider the delayed recognition of income in the current year as especially costly. We believe that a period-specific managerial concern about the level of reported income is unlikely to be captured by a relatively slow-to-change Best rating.

Consequently, we adjust the year *t* Best rating down one level (e.g., from A+ to A) if "adjusted" earnings (from continuing operations) in year *t* is less than reported earnings (from continuing operations) in year $t-1$. Adjusted earnings for firm *i* in year *t* is reported earnings plus $ResErr_{it}$ (i.e., the reserve error, see Equation (14)). In essence, the adjusted earnings reflect *ex post* actual accident-year-specific losses as opposed to estimated losses. Finally, we set $Cf\_Ind = 1$ for firm-year observations with an adjusted Best rating of A− or lower and set $Cf\_Ind_{it} = 0$ for firm-year observations with an adjusted Best rating of A or higher.[23] We expect $Cf\_Ind = 1$ observations to have nontax costs that are relatively more sensitive to discretionary, tax-motivated current earnings reductions than $Cf\_Ind = 0$ observations because $Cf\_Ind = 1$ observations are in relatively poorer financial health than $Cf\_Ind = 0$ observations. In other words, we hypothesize that the linear and quadratic cost function parameters of observations with relatively low adjusted Best ratings ($Cf\_Ind = 1$) will be greater than the cost function parameters of observations with relatively high adjusted Best ratings ($Cf\_Ind = 0$). Hereafter, we refer to $Cf\_Ind = 0$ ($Cf\_Ind = 1$) observations as low (high) expected cost observations.

Regression Models

Given the intuition supporting the scaled model, the findings in prior research that larger firms are more likely to shift income for tax purposes, and the fact that prior P&C

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[22] Petroni (1992) finds that a partition of P&C firms on the basis of eight ratios specified by the National Association of Insurance Commissioners is related to a partition based on Best ratings. Petroni (1992) classifies as financially strong (weak) firms if none (one or more) of its eight ratios fall outside a range considered "normal." Petroni (1992) reports that financially strong (weak) firms by her criteria typically have a Best rating between A+ and B+ (B+ and D). Petroni's (1992, 493) procedures classify 18.5 percent (164/887) of the firms in her sample as financially weak. We classify 38.6 percent (61.4 percent) of our sample firms as having income-shifting cost functions that are more (less) sensitive to the delayed recognition of income.

[23] In no instance was a firm's Best rating adjusted downward two levels. There were 3 (30) incidences of case one (two) adjustments that led to a category switch from the low-cost category based on actual Best ratings to the high-cost category based on adjusted Best ratings for a total of 33 firm-year observations.

research has only used a scaled loss reserve measure, we only present results for the size-scaled models of income shifting. These models assume that the linear and quadratic cost function parameters are inversely proportional to the revised accident-year loss reserve. We do not include any variables that capture specific nontax factors (e.g., leverage) because the influence of all variables expected to affect the cost of income shifting are implicitly incorporated into the regression models through their influence on the linear and quadratic cost function parameters (l and q, respectively). We include a variable capturing the percentage reserve error from the prior year because it substantially reduces the degree of autocorrelation in the error term (relative to that without it).[24] The following regression models follow from Equations (11) and (12), respectively:

$$ResErr\%_{it} = \alpha_0(1/RevRes_{it}) + \alpha_1 MTB_{it} + \alpha_2 ResErr\%_{it-1} + \varepsilon_{it}, \tag{16}$$

$$\begin{aligned} ResErr\% = {} & \beta_0(1/RevRes_{it}) + \beta_1 MTB_{it} + \beta_2(Cf\_Ind_{it}/RevRes_{it}) \\ & + \beta_3 MTB_{it}\cdot Cf\_Ind_{it} + \beta_4 ResErr\%_{it-1} + \varepsilon_{it}. \end{aligned} \tag{17}$$

Given the relation between the coefficients of the regression models developed in section two (see Equations (11) and (12)) and the parameters of the cost function, it is possible to specify directional predictions for some of the regression coefficients. Based on the theoretical model represented by Equation (11), the coefficient estimate of *MTB* in Equation (16) is related to the quadratic cost function parameter as follows: $\alpha_1 = \{1/(2q)\}$. The quadratic parameter (i.e., q) is assumed to be positive so it follows that the estimate of α_1 should be positive. Similarly for Equation (17), we expect β_1 to be positive because $\beta_1 = \{1/(2q_a)\}$, where q_a is the quadratic parameter of the cost function of type a firms (such firms are represented by the small expected cost *Cf_Ind* = 0 observations). We also expect α_0 in Equation (16) to be negative because $\alpha_0 = -l/(2q)$ and we assume that both the linear (l) and quadratic (q) parameters of firms' cost functions are generally positive.[25] Similar reasoning suggests that the estimate of β_0 in Equation (17) will be negative: $\beta_0 = -l_a/(2q_a)$.

We have no prediction for the sign of the coefficient of the main effect cost function indicator variable (*Cf_Ind*) in Equation (17). The discussion in section two makes clear that the sign of β_2 can only be predicted if one knows the sign of $\{\frac{1}{2}[(l_a/q_a) - (l_b/q_b)]\}$, where the subscripts a and b refer to *Cf_Ind* = 0 and *Cf_Ind* = 1 observations, respectively. We will not know the linear and quadratic parameters of either *Cf_Ind* type until the coefficients in Equation (17) are estimated, so we cannot make a prediction about the sign of β_2.

The discussion following Equation (7) indicates that the sign of the coefficient of the interaction term ($MTB_{it}\cdot Cf\_Ind_{it}$) in Equation (17) will depend upon the sign of $\{\frac{1}{2}(1/q_b - 1/q_a)\}$, where the subscripts a and b refer to the *Cf_Ind* = 0 and *Cf_Ind* = 1 observations, respectively. The quadratic cost function parameter of the high expected cost (*Cf_Ind* = 1) observations is predicted to be larger than the quadratic parameter of the relatively low cost *Cf_Ind* = 0 observations so the expected sign of β_3 is negative.

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[24] When lagged reserve error is excluded the results on the other variables are generally similar to those reported.

[25] Our assumption that the linear parameter of the cost function is positive implies that there is a net cost associated with reducing current period income regardless of the level of income shifted. However, it is plausible that for some firms there could be a net benefit from reducing current period income (e.g., big bath). In such cases the linear term of the cost function coefficient could be negative, which would imply a positive sign for α_0.

V. RESULTS

This first part of this section provides descriptive statistics for the proxies used in the regression analysis and the second part presents the regression results. The third part uses the regression coefficient estimates to extract estimates of the parameters of the income-shifting cost functions and illustrates how these estimates can be used to obtain empirical estimates of the aggregate cost of cross-time income shifting. The fourth part examines the sensitivity of our cost estimates to alternative specifications of the tax incentive variable (*MTB*).

Descriptive Statistics

Panel A of Table 3 provides some descriptive statistics for the variables used in our analysis. Panel A reveals that the mean (median) dollar-based reserve error, i.e., *ResErr$*, is $48.72m ($8.09m). The mean (median) percentage reserve error, i.e., *ResErr%*, is 6.30 percent (5.66 percent). *ResErr%* ranges from −32.47 to 84.97 percent. The distributions of the reserve error variables include several outliers. The fact that the mean (median) of the reserve error variables are positive suggests that the P&C firms generally overestimate losses during our sample period (i.e., the initial accident-year liability estimate exceeds the ultimate accident-year total claims). Considerable variation exists in the dollar magnitude of the revised accident-year specific loss reserve (*RevRes*), which is our size-based scaling variable. The range of *RevRes* is between $2.23m and $5,875.30m, while the mean (median) value is $684.50m ($199.34m). The mean (median) value of the marginal tax benefit variable, i.e., *MTB*, is 0.0420 (0.0313). The mean value for *Cf_Ind* is 0.3858, which indicates that approximately 39 percent of the observations are coded 1 for this variable (i.e., coded as being relatively more sensitive to reductions in current period earnings). The last line of Panel A reports descriptive statistics on reported net income adjusted for the amount by which the initial accident-year loss reserve was misstated (denoted *Adj_OI*). *Adj_OI* measures pre-tax operating income as if the initial accident-year reserve estimate was recorded without any error (error-free-measure is proxied by *RevRes*). The mean (median) value for *Adj_OI* is $191.7m ($49.60m).

Panel B of Table 3 shows the mean, median (in italics), and standard deviation (in parentheses) of *ResErr%* and *RevRes* for each tax incentive (*MTB*) level. These data are presented for all sample observations and then separately for the *Cf_Ind* = 0 and *Cf_Ind* = 1 observations. In each case the mean and median *ResErr%* is greatest for the highest *MTB* level. As *MTB* levels fall from 0.0823 to 0.0000, *ResErr%* generally falls in a like manner. The relation between *MTB* and the mean and median values of *ResErr%* in the three sample partitions is not strictly monotonic, however (particularly, with the *Cf_Ind* = 1 observations).[26] The mean values of *ResErr%* for each *MTB* level are higher for the *Cf_Ind* = 0 observations than for the *Cf_Ind* = 1 observations, which suggests that the *Cf_Ind* = 0 observations incur smaller income shifting costs than the *Cf_Ind* = 1 observations. These differences in mean values indicate that the cost to shift income varies across the *Cf_Ind* groups and we expect that such cost differences will be reflected in across group differences in estimated linear and/or quadratic cost function parameters.

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[26] Since some cells have very few observations, the reported values are highly influenced by a few observations. The reported mean and median amounts reported *ResErr* percent amounts for *MTB* = 0.0126 observations appear particularly high. Six of the observations in the 0.0126 *MTB* level occur in 1987 (three in each *Cf_Ind* group). All six of the observations have positive *ResErr* percent values. The *ResErr* percent for the three *Cf_Ind* = 0 observations are particularly large, i.e., General Re 0.3546, Safeco 0.1206, and St. Paul Companies 0.2805.

TABLE 3
Descriptive Statistics and Correlation Matrix

Panel A: Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Min	Max
*ResErr$* ($ millions)	48.72	8.09	108.24	−224.88	558.00
ResErr%	0.0630	0.0566	0.1526	−0.3247	0.8497
RevRes ($ millions)	684.50	199.34	1031.00	2.23	5875.30
1/RevRes	0.0173	0.0050	0.0400	0.0002	0.4478
MTB	0.0420	0.0313	0.0406	0.0000	0.1846
Cf_Ind	0.3858	0.0000	0.4878	0.0000	1.0000
Cf_Ind/RevRes	0.0064	0.0000	0.0140	0.0000	0.1061
MTB·Cf_Ind	0.0115	0.0000	0.0262	0.0000	0.1846
lagResErr%	0.0362	0.0420	0.1680	−0.4438	0.8497
Adj_OI ($ millions)	191.71	49.60	320.16	1929.71	−393.00

Panel B: Mean, Median (in italics), and Standard Deviation (in parentheses) of *ResErr%* and *RevRes* by *MTB* Level for All Observations and for Earnings *Less-Sensitive* Observations (*CF_Ind* = 0) and More-Sensitive Observations (*CF_Ind* = 1)

	All Observations			*Cf_Ind* = 0 Observations			*Cf_Ind* = 1 Observations		
MTB	n	*ResErr%*	*RevRes*	n	*ResErr%*	*RevRes*	n	*ResErr%*	*RevRes*
0.1846	14	0.1893	444	11	0.2140	444	3	0.0991	82
		0.1507	*47*		*0.1706*	*47*		*0.1192*	*36*
		(0.2008)	(890)		(0.2211)	(890)		(0.0461)	(89)
0.0823	28	0.1417	428	21	0.1706	428	7	0.0550	580
		0.1223	*115*		*0.1525*	*115*		*0.0131*	*63*
		(0.1578)	(891)		(0.1575)	(891)		(0.1330)	(925)
0.0556	13	0.0599	319	11	0.0872	319	2	−0.0907	46
		0.0508	*134*		*0.0697*	*134*		*−0.0907*	*46*
		(0.1325)	(634)		(0.1254)	(634)		(0.0087)	(36)
0.0437	5	0.0495	1157	4	0.0770	1157	1	−0.0608	162
		0.0182	*1211*		*0.0209*	*1211*			
		(0.1213)	(991)		(0.1206)	(991)			
0.0313	149	0.0539	678	100	0.0752	678	49	0.0103	682
		0.0543	*214*		*0.0727*	*214*		*0.0047*	*121*
		(0.1477)	(1133)		(0.1437)	(1133)		(0.1477)	(1072)
0.0126	13	0.0687	1119	4	0.1758	1119	9	0.0210	1037
		0.0360	*1301*		*0.2006*	*1301*		*0.0143*	*1703*
		(0.1272)	(879)		(0.1809)	(879)		(0.0611)	(927)
0.0000	32	−0.0177	943	5	0.0693	943	27	−0.0337	677
		−0.0256	*193*		*0.0740*	*193*		*−0.0311*	*70*
		(0.1111)	(1225)		(0.0746)	(1225)		(0.1102)	(1112)
All obs.	254	0.0630	684	156	0.1011	694	98	0.0022	669
		0.0566	*199*		*0.0943*	*261*		*0.0004*	*96*
		(0.1526)	(1083)		(0.1543)	(1118)		(0.1290)	(1029)

(*continued on next page*)

TABLE 3 (continued)

Panel C: Correlation Coefficients (Pearson above the diagonal and Spearman below the diagonal)

	ResErr%	*1/RevRes*	*MTB*	*Cf_Ind/RevRes*	*MTB·Cf_Ind*	*lagResErr%*
ResErr%		−0.0417	0.2941	−0.2589	−0.0917	0.4783
1/RevRes	−0.1966		0.2788	0.2256	0.0096	−0.0602
MTB	0.2764	0.1466		−0.1028	0.3129	−0.0615
Cf_Ind/RevRes	−0.3805	0.3039	−0.3295		0.3724	−0.2050
MTB·Cf_Ind	−0.2179	0.1059	0.0813	0.7497		−0.1258
lagResErr%	−0.5182	−0.1612	0.0595	−0.2635	−0.0954	

Correlations with absolute magnitude greater than 0.1275 are significant at $p < 0.05$.
Correlations with absolute magnitude greater than 0.1620 are significant at $p < 0.01$.
This table presents descriptive statistics for variables used in this analysis (Panel A), descriptive statistics on the loss reserve estimation error and size of the loss reserve account by tax incentive to shift income and by the cost function sensitivity variable (Panel B), and Pearson and Spearman correlation coefficients (Panel C). *ResErr$* is loss reserve estimation error computed as the difference between the original loss reserve estimate disclosed in the financial statements for year *t* (*OrigRes*) and the revised loss amount for accident-year *t* disclosed in the financial statements for year t+5 (*RevRes*). *ResErr%* and *ResErr$* scaled by the revised loss reserve estimate (i.e., $ResErr\%_{it} = (OrigRes_{it} - RevRes_{it})/RevRes_{it}$). MTB_{it} measures the economic incentive to defer taxable income, it spans the interval [0 − 0.1846], and is coded as presented in Table 2. Cf_Ind_{it} is a binary variable indicating sensitivity to current earnings reductions and is coded 1 (0) for observations more (less) sensitive to current earnings reductions. The basis for this sample partition is the lower of the reported Best Rating in year *t* or year *t*+1 plus an adjustment for potentially binding current income constraints (the adjustment lowers the Best rating one level—for example from A− to B+). A firm is considered facing a binding current income constraint if adjusted operating income (*Adj_OI*) in year *t* is less than reported pre-tax operating earnings from year *t*−1. Firms with an adjusted Best rating of A− or weaker are classified as more sensitive to current earnings reductions (*Cf_Ind* = 1). *lagResErr%* is the one-year lagged value of *ResErr%* for firm *i*. *Adj_OI* is reported pre-tax operating income adjusted for the accident-year loss reserve error (i.e., pre-tax operating income + *ResErr$*).

Panel C of Table 3 reports the Pearson (above the diagonal) and Spearman (below the diagonal) correlation coefficients among the regression variables. Consistent with larger tax incentives inducing more income shifting, the correlation between the tax incentive variable (*MTB*) and the percentage loss reserve error (*ResErr%*) is positive and highly significant ($p < 0.0001$). The scaled cost function indicator variable (*Cf_Ind/RevRes*) is negatively correlated with *ResErr%* ($p < 0.0001$).[27] This negative correlation is consistent with findings in prior research (e.g., Petroni 1992) that weaker insurers (i.e., those more concerned about regulatory scrutiny) are less likely than other insurers to shift income from the current period to future periods through the loss reserve account. The correlation between the firm-specific loss reserve error in period *t* and the loss reserve error in period *t*−1 is also highly significant.

Regression Results

Panels A and B of Table 4 present the results of estimating the regression model represented by Equations (16) and (17), respectively. Equation (16) forces a single cost function on all sample firms. Equation (17) incorporates the cost sensitivity indicator variable (*Cf_Ind*) and generates two separate sets of cost function parameter estimates based on *a priori* expectations of the relative sensitivity of nontax costs to a reduction in current

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[27] The Pearson correlation coefficient between *Cf_Ind* and *ResErr* percent is −0.3160 ($p < 0.0001$).

TABLE 4
Regression Analysis

This table presents results from estimating the following two models:

$$ResErr\%_{it} = \alpha_0(1/RevRes_{it}) + \alpha_1 MTB_{it} + \alpha_2 ResErr\%_{it-1} + \varepsilon_{it}, \text{ and} \tag{16}$$

$$ResErr\% = \beta_0(1/RevRes_{it}) + \beta_1 MTB_{it} + \beta_2(Cf\_Ind_{it}/RevRes_{it}) + \beta_3 MTB_{it}{\cdot}Cf\_Ind_{it} + \beta_4 ResErr\%_{it-1} + \varepsilon_{it}. \tag{17}$$

Panel A: Estimation of Equation (16)

$$ResErr\%_{it} = \alpha_0(1/RevRes_{it}) + \alpha_1 MTB_{it} + \alpha_2 ResErr\%_{it-1} + \varepsilon_{it}$$

	α_0	α_1			α_2
	−	+			?
Coefficient estimate (WLS)	−0.5841[a]	1.2354[b]	—	—	0.4894[b]
Standard error (Newey-West)	0.2055	0.1414	—	—	0.0480

Model F-value = 67.79 ($p < 0.0001$) and adj. R^2 = 45.09%.

Panel B: Estimation of Equation (17)

$$ResErr\% = \beta_0(1/RevRes_{it}) + \beta_1 MTB_{it} + \beta_2(Cf\_Ind_{it}/RevRes_{it}) + \beta_3 MTB_{it}{\cdot}Cf\_Ind_{it} + \beta_4 ResErr\%_{it-1} + \varepsilon_{it}$$

	β_0	β_1	β_2	β_3	β_4
	−	+	?	−	?
Coefficient estimate (WLS)	−0.5576[a]	1.4588[b]	−0.2660	−0.8676[b]	0.4773[b]
Standard error (Newey-West)	0.2077	0.1624	0.5263	0.2725	0.0479

Model F-value = 47.55 ($p < 0.0001$) and adj. R^2 = 47.82%.

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[a] ([b]) Indicates a significant t-statistic at $p \leq 0.01$ ($p \leq 0.001$), one-tailed test where coefficient signs are predicted.

The subscript i represents firm and the subscript t represents year. $ResErr\%_{it}$ is loss reserve estimation error computed as the difference between the original loss reserve estimate for year t ($OrigRes_{it}$) disclosed in year t and the revised loss reserve amount for accident-year t disclosed in year t+5 ($RevRes_{it}$) scaled by the revised loss reserve estimate (i.e., $ResErr\%_{it} = (OrigRes_{it} - RevRes_{it})/RevRes_{it}$). MTB_{it} measures the economic incentive to defer taxable income, it spans the interval [0, 0.1846], and is coded as detailed in Table 2. Cf_Ind_{it} is a binary variable indicating sensitivity to current earnings reductions and is coded 1 (0) for observations more (less) sensitive to current earnings reductions. The basis for this sample partition is the lower of the reported Best Rating in year t or year t+1 plus an adjustment for potentially binding current income constraints (the adjustment lowers the Best rating one level—for example from A− to B+). A firm is considered facing a binding current income constraint if adjusted operating income (*Adj_OI*) in year t is less than reported pre-tax operating earnings from year $t-1$. Firms with an adjusted Best rating of A− or weaker are classified as more sensitive to current earnings reductions (*Cf_Ind* = 1). The prior year value for lagged value of *ResErr%* ($ResErr\%_{it-1}$) is included in the model to reduce the extent of autocorrelation in the regression residuals. Reported coefficient estimates are from using weighted least squares to reduce the effect of influential observations and the reported standard errors are those from using the Newey and West (1987) procedure to adjust for heteroscedastic and auto-correlated residuals. The regression weighting factor is based on the observations absolute DFFITS value from a first-stage regression; observations with |DFFITS| ≤ .34 are assigned a weight of 1 while those with larger values are assigned a weight of .34/|DFFITS|.

earnings. Inclusion of the prior year loss reserve error ($ResErr_{it-1}$) as an independent variable in both models substantially reduces the autocorrelation of the residuals relative to that without it.[28] We report coefficient estimates from a weighted least squares (WLS) procedure that reduces the weight received by highly influential observations (based on DFFITS value)[29] and Newey-West heteroscedastic and auto-correlated corrected standard errors (see Newey and West 1987).

Table 4, Panel A reports results from estimating the single-cost-function model represented by Equation (16). The estimate of α_0 (i.e., coefficient on $1/RevRes$) is -0.5841, consistent with the predicted direction and statistically less than zero at $p = 0.003$. The estimate of α_1 (i.e., coefficient on *MTB*) is 1.2354 and significantly greater than zero ($p < 0.001$), as hypothesized.

Table 4, Panel B reports results from estimating the dual-cost-function model represented by Equation (17). We note that the adjusted R^2 from estimating Equation (17) is slightly larger than that from estimating Equation (16), 47.82 versus 45.09 percent, and the signs of the coefficient estimates are consistent with theoretical predictions. The estimate of β_0 (i.e., coefficient on $1/RevRes$) is -0.5576 ($p = 0.004$) and the estimate of β_1 (i.e., coefficient on *MTB*) is 1.4588 ($p < 0.001$). The estimated coefficient of the scaled cost function indicator variable, β_2, for which no directional prediction is made, is -0.2660 and is not significantly different from zero at an alpha level of 10 percent. However, the estimate of β_3 (i.e., coefficient of *MTB·Cf_Ind*) is -0.8676 and is significantly less than zero ($p = 0.001$).[30]

Extracting Cost Function Parameter Estimates and Quantifying Aggregate Costs to Shift Income

The estimated coefficients on *MTB* ($\alpha_1 = 1.2354$) and on $1/RevRes$ ($\alpha_0 = -0.5841$) generated by estimating Equation (16) can be used to estimate the quadratic and linear parameters of a common income-shifting cost function for firms in the P&C industry. Based on the model represented by Equation (11) (the theoretical version of Equation (16)) an estimate of the cost function's quadratic parameter, denoted q_{est}, is extracted from the regression coefficient estimate on *MTB* as follows:

$$\alpha_1 = \{1/2q\} \rightarrow q_{est} = 1/2\alpha_1 = 1/(2\cdot 1.2354) = 0.4047. \tag{18}$$

Utilizing the estimate of the cost function's quadratic parameter (q_{est}) and the coefficient estimate of α_0, an estimate of the cost function's linear term, denoted l_{est}, can be computed as follows:

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[28] When the lagged value of *ResErr* percent is included in the model, the Durbin-Watson test for autocorrelation can be rejected at $p < 0.0085$ and the autoregressive parameter is approximately 0.14. This contrasts to a rejection level of $p < 0.0001$ and an autoregressive parameter of approximately 0.38 without its inclusion. We note that the adjusted R^2s are also considerably higher when the lagged *RerErr* percent is included in the model (approximately 45 percent) than when it is not (approximately 25 percent). The coefficient estimates (and related cost function parameter estimates) when lagged *ResErr* percent is not included in the models are similar to those reported in Table 4.

[29] The weighted least squares procedure reduces the weight of those observations deemed influential based on the DFFITS criterion (Welsch 1980). Observations with |DFFITS| less than or equal to 0.34 are assigned a weight of 1, while those observations with |DFFITS| greater than 0.34, more influential observations, are assigned a weight equal to 0.34 divided by the |DFFITS| value for that observation.

[30] The significance levels of the regression coefficient estimates are similar to those reported when observations with relatively large regression residuals are eliminated (studentized t-values larger than 2.96 or 2.65). The results are also robust to the elimination of all 1992 observations (Hurricane Andrew occurred during August 1992) from the analysis. The absolute magnitude of the regression coefficient estimates from these sensitivity analyses are slightly lower than those reported, which implies slightly greater cost function parameter estimates.

$$\alpha_0 = -l/2q = \rightarrow l_{est} = -2(q_{est})(\alpha_0) = -2(0.4047)(-0.5841) = 0.4728. \qquad (19)$$

Substituting these cost function parameter estimates and the operational definitions of *ds* and *s* into the cost function defined by Equation (8) generates the following income-shifting cost function estimate:

$$C(ResErr\$) = (0.4728/RevRes)ResErr\$ + (0.4047/RevRes)ResErr\$^2. \qquad (20)$$

This cost function allows one to quantify both the total costs of shifting some specified amount of financial accounting income (in millions) and the marginal costs associated with shifting the next dollar of financial accounting income as a function of the income shifted via the loss reserve account. Since the linear and quadratic parameter estimates are scaled by *RevRes* (revised accident-year specific losses), the costs are decreasing with the size of *RevRes*.

The estimated *common linear* cost function parameter (0.4728) suggests (via the second line of Equation (11)) that relatively small tax incentives will induce P&C firms to delay the recognition of some current income. Table 3 reveals that the mean (median) value of *RevRes* for the P&C firms in our sample period is approximately $685m ($200m); at this level of *RevRes* the coefficient of the linear term in the cost function is 0.0007 (0.0024).[31] This suggests that a sample firm with a mean (median) level of *RevRes* requires a tax incentive greater than 0.07 percent (0.24 percent) to shift its first dollar of income. For levels of *RevRes* equal to that of the tenth percentile of our sample firms, $26m, our results suggest that firms would require a tax incentive greater than 1.82 percent (0.4728/26) to shift its first dollar of income.

Table 5 relies on the cost function in Equation (20) and illustrates, for specified levels of revised loss reserves (*RevRes*), both the total cost (TC) to shift a given amount of income via the loss reserve account (as measured by *ResErr$*) and the marginal cost (MC) to shift another dollar of income given a specified level of *ResErr$*. As firm size (as measured by *RevRes*) increases, the total cost of shifting a given amount of income and the marginal cost of shifting another dollar of income both decrease. The inverse relation between firm size and total and marginal costs of income shifting is consistent with results of prior taxable income-shifting research (Scholes et al. 1992; Guenther 1994), which documents evidence of tax-motivated income shifting primarily among relatively large firms. Moving down the columns, the table shows that the estimated total cost of cross-time income shifting increases as the amount of shifted income increases (as measured by *ResErr$*). Table 5 also shows that as the specified level of shifted income increases, the marginal cost to shift another dollar of income increases rapidly. The implied total cost for a firm with a *RevRes* approximately equal to the sample mean ($685m) to overstate the accident-year reserve by $30m (*ResErr%* = 4.4 percent) is $0.552m and the implied marginal cost to shift another dollar beyond $30m is $0.036.[32] If the assumed *ResErr$* is increased to $100m (*ResErr%* = 14.6 percent), then the implied total cost is $5.977m and the implied marginal cost to shift another dollar is $0.119.

Because the dollars shifted for tax purposes is the same as the dollars shifted for financial accounting purposes, our cost analysis can also be presented in terms of accounting

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[31] Substituting for *RevRes* in Equation (20): 0.0007 = 0.4728/685 and 0.0024 = 0.4728/200.

[32] Our model implies that the marginal tax benefit from shifting will equal the marginal costs from shifting at the optimal amount of dollars shifted. Assuming a marginal tax benefit of $0.036 per dollar shifted, the net present value benefit from shifting $30m for a firm with *RevRes* equal to $685m is $0.528m [($0.036·$30m) − $0.552].

TABLE 5
Total Costs (TC) to Shift Specified Amount of Income via *ResErr$* and Marginal Cost (MC) to Shift Next Dollar

	RevRes													
ResErr$	**50 TC**	**50 MC**	**100 TC**	**100 MC**	**200 TC**	**200 MC**	**250 TC**	**250 MC**	**500 TC**	**500 MC**	**685 TC**	**685 MC**	**2000 TC**	**2000 MC**
1	0.018	0.018	0.009	0.009	0.004	0.004	0.004	0.004	0.002	0.002	0.001	0.001	0.000	0.000
5	0.250	0.090	0.125	0.045	0.062	0.023	0.050	0.018	0.025	0.009	0.018	0.007	0.006	0.002
10	0.904	0.171	0.452	0.086	0.226	0.043	0.181	0.034	0.090	0.017	0.066	0.013	0.023	0.004
15	1.963	0.252	0.982	0.126	0.491	0.063	0.393	0.050	0.196	0.025	0.143	0.018	0.049	0.006
20	3.427	0.333	1.713	0.167	0.857	0.083	0.685	0.067	0.343	0.033	0.250	0.024	0.086	0.008
25	5.295	0.414	2.648	0.207	1.324	0.104	1.059	0.083	0.530	0.041	0.387	0.030	0.132	0.010
30			3.784	0.248	1.892	0.124	1.514	0.099	0.757	0.050	0.552	0.036	0.189	0.012
40			6.665	0.329	3.332	0.164	2.666	0.131	1.333	0.066	0.973	0.048	0.333	0.016
50			10.355	0.409	5.177	0.205	4.142	0.164	2.071	0.082	1.512	0.060	0.518	0.020
60					7.427	0.245	5.942	0.196	2.971	0.098	2.168	0.072	0.743	0.025
70					10.081	0.286	8.065	0.229	4.033	0.114	2.943	0.083	1.008	0.029
80					13.140	0.326	10.512	0.261	5.256	0.130	3.837	0.095	1.314	0.033
90					16.604	0.367	13.283	0.293	6.642	0.147	4.848	0.107	1.660	0.037
100					20.473	0.407	16.378	0.326	8.189	0.163	5.977	0.119	2.047	0.041
125							25.532	0.407	12.766	0.203	9.318	0.148	3.191	0.051
150									18.355	0.244	13.397	0.178	4.589	0.061
250									50.827	0.406	37.100	0.296	12.707	0.101
350											72.620	0.414	24.872	0.142
450													41.085	0.182
500													50.709	0.203

This table shows the estimated total cost (in $ millions) to shift a specified amount of income via the initial liability recorded for accident-year losses (*ResErr$*) and the marginal cost to shift the next dollar beyond the specified amount for P&C firms of various sizes as measured by the re-estimated loss reserve (*RevRes*). The estimates are computed from the following income-shifting cost function:

$$C(ResErr\$) = (0.4728/RevRes)ResErr\$ + (0.4047/RevRes)ResErr\$^2. \quad (20)$$

The table illustrates that the total cost (TC) and marginal cost (MC) to overstate the reserve account (thereby understating income) both increase as the overstatement increases. The table also illustrates that the costs to shift a given level of income via the loss reserve estimate is decreasing in firm size.

earnings. Consider, for example, a sample firm of mean size ($685m *RevRes*) with unadjusted pre-tax operating earnings equal to $200m (slightly larger than the actual sample mean of $191.71): the total cost to reduce accounting income by 10 percent (thereby reducing taxable income), or $20m, is $0.25m. At this level of shifted income the marginal cost to shift another dollar is $0.024. While a $20m reserve overstatement reduces operating income by 10 percent, it only requires a 2.92 percent accident-year-specific loss reserve overstatement [$20m/$685m]. The total costs to reduce reported operating earnings by 20 percent, or $40m, through the estimate for current-year loss reserves are $0.973m and the marginal costs to shift another dollar are $0.048. In aggregate, the cost function estimates suggest that the costs of delayed income recognition for P&C firms are nontrivial, and that the costs escalate as the amount of income shifted increases. As noted earlier, shifting income in the P&C insurance industry via the initial loss reserve estimate is probably less costly than the taxable income-shifting mechanisms investigated in other settings because establishing the loss reserve estimate is unlikely to impose costs on external parties.

The dual cost function model represented by Equation (17) allows for the possibility that the cost function parameters will differ across firms that are assigned to two categories based upon their adjusted Best ratings. The regression results reported in Table 4, Panel B suggest that the cost functions of sample observations segregated on the basis of their adjusted Best ratings do differ. The cost function parameter estimates for observations expected to be have low costs (the $Cf\_Ind = 0$ observations) are computed as before (see Equations (18) and (19)). The parameter estimate for the quadratic term for $Cf\_Ind = 0$ observations, denoted q_{est_a}, is 0.34275 [1/(2·1.4588)] and the estimate for the linear term, denoted l_{est_a}, is 0.38223 [−2(0.34275)(−0.5576)]. The estimate of the quadratic parameter for the observations expected to have high costs (the $Cf\_Ind = 1$ observations), denoted q_{est_b}, is computed as (see Equation (7)):

$$\begin{aligned}\beta_3 = \{\tfrac{1}{2}(1/q_b - 1/q_a)\} \rightarrow q_{est\_b} &= (2\beta_3 + 1/q_{est\_a})^{-1} \\ &= [2(-0.8676) + (1/0.34275)]^{-1} \\ &= 0.84575,\end{aligned} \tag{21}$$

and the estimate of the linear parameter, denoted l_{est_b}, is computed as:

$$\begin{aligned}\beta_2 &= \{\tfrac{1}{2}[(l_a/q_a) - (l_b/q_b)]\} \rightarrow l_{est\_b} \\ &= -q_{est\_b}[2\beta_2 - (l_{est\_a}/q_{est\_a})] \\ &= -0.84575[2(-0.2660) - (0.38223/0.34275)] \\ &= 1.39311.\end{aligned} \tag{22}$$

Thus, the estimated cost functions for the low and high expected cost P&C observations are, respectively:

$$\begin{aligned}C_{Cf\_Ind=0}(ResErr\$) = {} & (0.38223/RevRes)ResErr\$ \\ & + (0.34275/RevRes)ResErr\$^2, \text{ and}\end{aligned} \tag{23}$$

$$\begin{aligned}C_{Cf\_Ind=1}(ResErr\$) = {} & (1.39311/RevRes)ResErr\$ \\ & + (0.84575/RevRes)ResErr\$^2.\end{aligned} \tag{24}$$

The results of estimating Equation (16) are consistent with the segregation of firms into two groups based upon their adjusted Best ratings. Observations with relatively low adjusted Best ratings are, in fact, high cost observations because they have larger linear and quadratic cost function parameter estimates than the observations with relatively high Best ratings. The consequences of these cost function differences are highlighted in Table 6. Table 6 shows the *marginal cost* of shifting an additional dollar of income via the loss reserve account for various levels shifting for both the low cost (*Cf_Ind* = 0) observations and the high cost (*Cf_Ind* = 1) observations. The estimated marginal cost decreases as firm size increases (across the table) and marginal cost increases as the level of income shifted increases (down the columns of the table). For a given level of *RevRes* and loss reserve overstatement (*ResErr$*), the estimated marginal cost is substantially higher for observations with relatively low adjusted Best ratings than for the observations with relatively high adjusted Best ratings. For example, for an observation with a relatively high Best rating and with a *RevRes* of $685m, the total cost to shift $30m via the initial loss reserve estimate is $0.467m (not shown in table) and the marginal cost to shift another dollar is $0.031. While for an observation with a relatively low Best rating and the same *RevRes* of $685m, the total and marginal costs are $1.172m and $0.076, respectively. The results suggest that both types (of observations) trade-off tax and nontax considerations, but the nature of the trade-off differs across types.

Sensitivity of Cost Estimates to Specification of Marginal Tax Benefit (*MTB*)

The accuracy of the cost estimates is affected by the accuracy of the *MTB* estimates. In our empirical application, *MTB* is affected by firms' current and expected tax rates, the length of the deferral period, the loss reserve discount ratio, and the after-tax discount rate (or cost of capital). We investigate the sensitivity of our cost estimates to changes to the deferral period, loss reserve discount ratio, and discount rate. We view the findings from the previous section as point estimates and the intent of this sensitivity analysis is to place bounds around the point estimates and illustrate the sensitivity of the cost estimates to alternative *MTB* measures.

In this sensitivity analysis we allow: (1) the deferral period to be either one year, i.e., deferral in year t fully reverses at the end of year $t+1$ or two years, i.e., entire deferral reverses at the end of year $t+2$, (as opposed to the initially assumed 1.5 year deferral period); (2) the loss reserve discount ratio to be either 0.80 or 0.90 (as opposed to 0.85); and (3) the after-tax discount rate to be either 7 or 9 percent (as opposed to 8 percent). For each year included in our sample we select that combination of the three factors that creates both the highest and lowest computed *MTB* for taxpaying firms. Non-taxpaying firms have an *MTB* of zero and this value is not impacted by altering the assumptions about the deferral period, loss reserve discount ratio, or discount rate. Note that the *range* of *MTB*s will be larger (smaller) for the set of assumptions that produce the largest (smallest) *MTB*s of taxpaying firms. This means that the assumptions associated with the higher estimated *MTB* values will generate lower regression coefficient estimates on *MTB* and thus higher cost

TABLE 6
Marginal Costs ($) to Shift Next Dollar of Income via *ResErr$* for Current Earnings *Less-Sensitive* and *More-Sensitive* Firms

	RevRes													
ResErr$	**50 less**	**50 more**	**100 less**	**100 more**	**200 less**	**200 more**	**250 less**	**250 more**	**500 less**	**500 more**	**685 less**	**685 more**	**2000 less**	**2000 more**
1	0.014	0.045	0.007	0.022	0.004	0.011	0.003	0.009	0.001	0.004	0.001	0.003	0.000	0.001
5	0.076	0.197	0.038	0.099	0.019	0.049	0.015	0.039	0.008	0.020	0.006	0.014	0.002	0.005
10	0.145	0.366	0.072	0.183	0.036	0.092	0.029	0.073	0.014	0.037	0.011	0.027	0.004	0.009
15	0.213	0.535	0.107	0.268	0.053	0.134	0.043	0.107	0.021	0.054	0.016	0.039	0.005	0.013
20	0.282	0.704	0.141	0.352	0.070	0.176	0.056	0.141	0.028	0.070	0.021	0.051	0.007	0.018
25	0.350	0.874	0.175	0.437	0.088	0.218	0.070	0.175	0.035	0.087	0.026	0.064	0.009	0.022
30			0.209	0.521	0.105	0.261	0.084	0.209	0.042	0.104	0.031	0.076	0.010	0.026
40			0.278	0.691	0.139	0.345	0.111	0.276	0.056	0.138	0.041	0.101	0.014	0.035
50			0.347	0.860	0.173	0.430	0.139	0.344	0.069	0.172	0.051	0.125	0.017	0.043
60					0.208	0.514	0.166	0.412	0.083	0.206	0.061	0.150	0.021	0.051
70					0.242	0.599	0.193	0.479	0.097	0.240	0.071	0.175	0.024	0.060
80					0.276	0.684	0.221	0.547	0.110	0.273	0.081	0.200	0.028	0.068
90					0.310	0.768	0.248	0.615	0.124	0.307	0.091	0.224	0.031	0.077
100					0.345	0.853	0.276	0.682	0.138	0.341	0.101	0.249	0.034	0.085
125							0.344	0.851	0.172	0.426	0.126	0.311	0.043	0.106
150									0.206	0.510	0.151	0.372	0.052	0.128
250									0.344	0.849	0.251	0.619	0.086	0.212
350											0.351	0.866	0.120	0.297
450													0.154	0.381
500													0.172	0.424

This table shows the estimated marginal cost (in $ millions), denoted MC, to shift the next dollar of income beyond the specified amount via the initial estimate for accident-year losses (*ResErr$*) for both current-earnings *less* (*Cf_Ind* = 0) and *more-sensitive* (*Cf_Ind* = 1) P&C firms of various sizes (as measured by the re-estimated loss reserve, *RevRes*). The marginal cost estimates for *less-sensitive* and *more-sensitive* observations are computed from the following income-shifting cost functions, respectively:

$$C_{Cf\_Ind=0}(ResErr\$) = (0.38223/RevRes)ResErr\$ + (0.34275/RevRes)ResErr\$^2, \qquad (23)$$

$$C_{Cf\_Ind=1}(ResErr\$) = (1.39311/RevRes)ResErr\$ + (0.84575/RevRes)ResErr\$^2. \qquad (24)$$

The table illustrates for both firm types (1) that the marginal cost, and thus total costs, to overstate the loss reserve account (thereby understating income) both increase as the overstatement increases, (2) that the costs to shift a given level of income via the loss reserve estimate are decreasing in firm size, and (3) that the marginal costs to shift another dollar are higher for firms considered more sensitive to current earnings reduction than for those considered less sensitive.

function parameter estimates. Consequently, the implied parameter estimates from the assumptions that produce the high (low) *MTB* values provide upper-bound (lower-bound) cost estimates.[33]

Untabulated regression analysis of the single cost function model (Equation 16) produces lower and upper bounds for the estimates of the linear parameter of 0.3138 and 0.6492, respectively, while the upper and lower bounds on the quadratic parameter are 0.2764 and 0.5574, respectively. The lower-bound (upper-bound) estimates imply total and marginal costs that are approximately 32 percent lower (37 percent higher) than those reported in Table 5. For a firm with *RevRes* of $685m the bounds imply that the total cost of overstating the loss reserve by $30m is between $0.377m and $0.761m (relative to $0.552m reported in Table 5) and the marginal cost to shift another dollar is between $0.025 and $0.05 (relative to $0.036 reported in Table 5).

The cost function bounds generated by the dual cost function model (Equation 17) are similar in magnitude to those for the single cost function.[34] For low-cost observations, the lower-bounds (upper-bounds) on total and marginal costs are approximately 31 percent lower (37 percent higher) than those reported in Table 6. For a low-cost observation with a *RevRes* of $685m, the bounds imply that the total cost of overstating the loss reserve by $30m are between $0.321m and $0.641m and the marginal cost to shift another dollar is between $0.021 and $0.042 (relative to $0.031 reported in Table 6). For high-cost observations, the lower-bounds (upper-bounds) are 27 percent lower (40 percent higher) than those reported in Table 6. The bounds for a high-cost observation imply that the total cost of overstating the loss reserve by $30m is between $0.855m and $1.638m and the marginal cost of shifting another dollar is between $0.056 and $0.106 (relative to $0.076 reported in Table 6).

VI. DISCUSSION AND CONCLUSIONS

Efficient tax planning implies that tax considerations are balanced against other considerations and that the decision maker will not necessarily minimizes taxes but will maximize expected after-tax wealth. In general, the optimal level of tax-minimizing activities is the level where the expected marginal tax benefits equal the expected marginal costs of the final activity. Prior research has examined whether publicly held firms are willing to sacrifice current earnings to reduce taxes and has identified factors that may affect this decision, but it has only provided limited insight about the magnitude of the aggregate costs associated with shifting taxable income. This study presents a method to estimate these costs and conducts an empirical application using publicly traded P&C firms. We believe that future progress in quantifying the magnitude of costs that impede tax minimization can be made by following the path of this study.

Our method presumes that there are costs associated with delaying the recognition of taxable income and that these costs can be modeled as a quadratic function of the amount of dollars shifted. The linear and quadratic parameters of the income-shifting cost function, in conjunction with marginal tax benefit of delayed income recognition, determine the optimal amount of taxable income to shift into the future. We generate sample-wide estimates of the linear and quadratic parameters of the income-shifting cost function from a linear regression of income shifted on the marginal tax benefit from such shifting.

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[33] The low *MTB* measures are (from highest to lowest): 0.1235, 0.0658, 0.0374, 0.0297, 0.0178, 0.0105, and 0.0000. To compute the low *MTB* measures we use a one-year deferral period and a 7 percent discount rate. The loss reserve discount ratio is 0.90 for 1986 observations and 0.80 for post-1986 observations. The high *MTB* measures are (from highest to lowest): 0.2472, 0.1024, 0.0748, 0.0594, 0.0484, 0.0149, and 0.0000. To compute the high *MTB* measures we use a two-year deferral period and 9 percent discount rate. The loss reserve discount ratio is 0.80 for 1986 observations and 0.90 for post-1986 observations.

[34] The linear and quadratic terms for *less-sensitive* (*more-sensitive*) firms are bounded between 0.2562–0.5165 (0.9665–1.9596) and 0.2356–0.4703 (0.6188–1.1815), respectively.

Our results suggest that the costs to shift taxable income for publicly held P&C firms are nontrivial. This finding is consistent with some prior findings (Engel et al. 1999) that suggest that the costs that impede tax minimization are relatively high. We find that the marginal cost of shifting another dollar of income increases as more dollars are shifted and that the costs are inversely related to firm size. We also show that the exact form of a firm's cost function is likely related to specific nontax factors. For example, state solvency regulation imposes minimum capital and surplus requirements on P&C firms—similar to leverage constraints outside the P&C industry—such that the cost to understate current period net income is decreasing in the actual financial position of the insurer (Petroni 1992, 487). Similarly, like firms outside the insurance industry, P&C firms are affected by financial reporting costs because current performance indicators (such as current period net income and return on beginning assets) become less favorable as income is shifted into the future. Partitioning firms into two groups based on an aggregate measure of regulatory and financial reporting concerns, we find that the (nontax) cost to shift taxable income is substantially higher for firms whose costs were considered to be more sensitive to a reduction in current earnings.

The loss reserve account of P&C firms has some special properties. Managing the loss reserve account requires neither the cooperation of a third-party nor a near-term commitment of cash (as other taxable-income-shifting mechanisms typically do). Consequently, our cost estimates for the P&C industry are likely to be a lower bound to the cost estimates of income shifting in other industries.

Our empirical application made several simplifying assumptions whose consequences remain to be determined. For example, we did not incorporate firm- and time-specific measures of either interest rates or loss reserve discount ratios. Incorporating these refinements would impact our calculation of the marginal tax benefits of income shifting and could have an impact on our estimates of cost function parameters. We did conduct sensitivity analysis that varied the interest rate and the loss reserve discount ratio, but our procedures forced the same alternative values on all firm-year observations. The impact of incorporating firm- and time-specific interest rates and loss reserve ratios on the estimates of the cost function parameters is left to future research.

APPENDIX A

This appendix illustrates the double deduction that was created by TRA86's fresh-start benefit. TRA86 required that loss reserve discounting beginning in 1987. The fresh-start benefit arises because TRA86's transitional rule allowed the 1987 beginning loss reserve balance to be discounted despite the fact that the undiscounted amount was used in determining 1986 taxable income.

Assume: (1) a loss reserve discount ratio of 85 percent,[35] (2) a 1987 beginning-of-year (BOY) financial statement loss reserve balance of $100, (3) a 1987 end-of-year (EOY) financial statement loss reserve balance of $150, and (4) no claim losses paid during 1987. Given the discounting requirement imposed by TRA86, the 1987 EOY loss reserve for tax purposes is $127.50 ($150 × 85%). Absent the fresh-start adjustment, the 1987 BOY loss reserve for tax purposes would have been \$100 (i.e., the amount reported in the financial statements and previously deducted for tax purposes). Given the fresh-start adjustment, however, the 1987 BOY loss reserve for tax purposes is only \$85 (\$100 × 85%). These amounts are summarized below:

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[35] The loss reserve discount ratio is the ratio of the present value of the loss reserve estimate to the undiscounted value of the loss reserve estimate. We use this pedagogical concept here to provide a convenient way to calculate the present value of the loss reserve from knowledge of the undiscounted value of the loss reserve.

Loss Reserve per Financial Statements	Loss Reserve for Tax Purposes *with* Fresh Start	Loss Reserve for Tax Purposes *absent* Fresh Start
1/1/87	1/1/87	1/1/87
\$100.00	\$85.00 = (\$100 × 85%)	\$100.00 per financials
12/31/87	12/31/87	12/31/87
\$150.00	\$127.50 = (\$150 × 85%)	\$127.50 = (\$150 × 85%)

The difference between the 1/1/87 undiscounted loss reserve, \$100, and the 1/1/87 discounted loss reserve, \$85, is effectively deducted twice. The first deduction occurred during pre-1987 years. Since tax rules in place for pre-1987 years did not require discounting, the entire \$100 loss reserve balance was deducted. The \$15 difference is effectively deducted a second time in 1987 due to the fresh-start adjustment. This adjustment allows the 1/1/87 loss reserve balance to be discounted in computing the 1987 loss reserve addition despite the fact that the entire loss reserve has already been deducted. Thus, the 1987 tax deduction for loss reserves is \$42.50 (difference between the 12/31/87 and 1/1/87 discounted loss reserve amounts, i.e. \$127.50–\$85.00). Without this adjustment the 1987 deduction would be \$27.50 (difference between the discounted 12/31/87 and the undiscounted 1/1/87 loss reserve amounts, i.e. \$127.50–\$100.00). So the fresh-start adjustment creates an additional \$15 tax deduction in 1987.

APPENDIX B

This appendix explains the computation of our operational measure of the marginal tax benefit from shifting income, denoted *MTB*. *MTB* is the year-end present value of tax savings associated with using the accident-year-specific loss reserve account to defer a dollar of financial accounting income (thus reducing taxable income by \$1 multiplied by the loss reserve discount factor) from the current period (the deferral period) to some future period (the reversal period). Thus, several factors impact *MTB:* the duration of tax deferral,[36] the cost of capital,[37] the loss reserve discount ratio,[38] and the tax rate in the both the deferral and reversal periods. To the extent the assumptions we make about these factors predominately understate (overstate) *MTB*, the implied income-shifting cost estimates will be understated (overstated). Sensitivity analyses presented in section five examine the robustness of our costs estimates to alternative assumptions regarding the factors impacting *MTB*.

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[36] We assume that a \$1.00 loss reserve overstatement recorded in year t is reversed by \$0.50 in year $t+1$ and \$0.50 in year $t+2$. This implies that the duration of tax deferral is on average 1.5 years. We examined the reasonableness of the 1.5 year tax deferral period by examining the loss reserve development data for one-half of the sample firms. We found that, on average, 47 percent of the accident-year-specific loss reserve overstatement reverses out the following year (i.e., for a \$1.00 overstatement recorded in year t, on average \$0.47 reverses in year $t+1$). This implies that on average 53 percent of the year t deferral reverses in year $t+2$ or in subsequent year(s).

[37] We use an 8 percent after-tax cost of capital, determined as follows. We use the rate of return to a one-year Treasury bond to estimate the real risk-free rate. Over our sample period 1986–1992, the average after-tax return on a one-year Treasury bond was 4.27 percent. We choose the return to a one-year Treasury because it coincides with our assumed 1.5 year tax deferral period. We then add a 3.75 percent risk premium, consistent with Erickson et al. (2003, 23).

[38] We assume an 85 percent loss reserve discount ratio, as discussed in footnote 17.

To compute *MTB*, we first determine a firm's federal-tax-paying status for each year during our sample period; we do so using publicly available financial statement data. A firm-year observation is characterized as federal-regular-income-taxpaying if it does not report the existence of a federal income tax net operating loss (NOL) carryforward.[39] Firm-year observations that do disclose a tax-basis NOL carryforward are examined to determine whether the firm paid federal income tax (regular income tax and/or alternative minimum tax) in spite of the NOL. A firm that discloses a tax-basis NOL could be a taxpaying firm if tax rules restrict the firm from completely eliminating current year taxable income with the NOL carryforward.[40] The *MTB* variable for our firm-year observations can take on the values 0.1846, 0.0823, 0.0598, 0.0556, 0.0437, 0.0313, 0.0126, and 0.0000 during our sample period. We explain each *MTB* level in more detail below.

Since the tax rules affecting P&C firms' loss reserve deduction were stable during 1988–1992, we first explain the *MTB* computations for this period. The top U.S. statutory tax rate for corporate taxpayers over these years was 34 percent.[41] Thus, for a taxpaying firm the benefit associated with deferring federal taxable income is the difference between the taxes avoided in the current year and the present value of taxes deferred into a future year (i.e., a time-value-of-money savings). Assuming a 1.5 year tax-deferral period, an 8 percent cost of capital, and 85 percent loss reserve discount ratio, using the loss reserve to shift income in any year between 1988–1992 provided a net-present-value tax savings to firm-year observations characterized as federal-taxpaying of 0.0313 $[\$1.00 \cdot 85\% \cdot 34\% - (\$0.50 \cdot 85\% \cdot 34\%)/1.08 - (\$0.50 \cdot 85\% \cdot 34\%)/(1.08)^2]$ for each dollar of financial income shifted. Firm-year observations that have an unrestricted regular tax NOL carryforward but pay AMT are also taxpaying (such observations would only pay federal AMT, they would not be subject to the federal regular income tax) but have a smaller incentive to defer income than regular-taxpaying firms. The deferred AMT is re-paid (in the form of a lower AMT credit than would have existed had AMT not been deferred) when the firm's AMT credit is utilized (in year $t+1$ or subsequent); for purposes of our *MTB* computation we assume that the AMT credit is utilized in year $t+1$.[42] Given the 20 percent AMT rate, the *MTB* for firms characterized as AMT-taxpaying during 1988–1992 is 0.0126 $\{(\$1.00 \cdot 85\% \cdot 20\%) - [\$1.00 \cdot 85\% \cdot (34\% - 14\%)/1.08]\}$.[43] Non-federal-taxpaying firms (i.e., those with available net operating losses that did not pay AMT) receive no federal tax benefit from overstating loss reserve estimates because the overstatement does not reduce current taxes paid.[44] Consequently, the *MTB* for such 1988–1992 firm-year observations is 0.0000.

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[39] Since tax status classification is based on the year-end presence of an NOL carryforward, firms that are able to fully carryback a current-period loss are classified as taxpaying because, as noted in Maydew (1997), such firms have a tax incentive to increase the current period loss.

[40] Rules that could limit the use of NOLs include the IRC §382 limitation on NOL carryforwards following ownership change, the separate return year limitation (SRLY) rules under Treas. Reg. §1.502-20, and/or the limitations specific to life/nonlife insurance company consolidated groups under Treas. Reg. §1.1502-47. Additionally, IRC §56(d) limits the alternative tax NOL deduction to 90 percent of current year alternative minimum taxable income.

[41] The 34 percent tax rate applied to taxable income in excess of $75,000. Given this relatively low threshold, we assume all taxpaying firms are subject to a 34 percent marginal tax rate during the years 1988–1992. We ignore the 1 percent income tax rate increase in 1993 because the increase was not proposed until after the first quarter of 1993.

[42] Because the AMT credit will be utilized when regular tax exceeds AMT—and given that income from sources other than reversal of the loss reserve could give rise to such regular tax liability—the time-value-of-money benefit to AMT deferral is not dependent on the loss reserve reversal (unlike the deferral and reversal of regular tax).

[43] During the period 1988–1992, shifting income via the loss reserve reduces regular tax at a rate of 34 percent and reduces AMT at a rate of 20 percent—thereby increasing the AMT credit by 14 percent of each *tax* dollar shifted. So, when $1.00 reverses, the regular tax rate of 34 percent is offset by 14 percent AMT credit. Said another way, 20 percent deferred in year t is fully repaid when the firm is subject to regular tax in year $t+1$ (or later year).

We next discuss the computation of *MTB* for the 1987 tax year. The *MTB* for 1987 includes not only the time-value-of-money incentive present during the period 1988–1992, but also a tax rate incentive attributable to the TRA86 tax-rate reduction from 40 to 34 percent (see section three). Assuming a 1.5 year tax-deferral period, an 8 percent cost of capital, and 85 percent loss reserve discount ratio, using the loss reserve to shift income in 1987 provides a net-present-value tax savings to a taxpaying firm of \$0.0823 $[\$1.00 \cdot 85\% \cdot 40\% - (\$0.50 \cdot 85\% \cdot 34\%)/1.08 - (\$0.50 \cdot 85\% \cdot 34\%)/(1.08)^2]$ for each dollar of financial income shifted. We include the 1987 firm-year observations characterized as AMT-payers in the *MTB* 0.0823 group because the tax-rate decrease is effectively captured in the AMT credit. The *MTB* for 1987 firm-year observations characterized as nontaxpaying is 0.0000 because there is no federal tax benefit from overstating loss reserve estimates.[45]

In addition to tax deferral and rate change benefits, the computation of *MTB* for the 1986 year also includes the tax benefit from the fresh-start adjustment. First, consider only the tax-rate reduction and time-value-of-money incentives. Assuming a 1.5 year tax-deferral period and an 8 percent cost of capital, using the loss reserve to shift income in 1986 provides a net-present-value tax savings to a taxpaying firm of \$0.1290 $[\$1.00 \cdot 46\% - (\$0.50 \cdot 40\%)/1.08 - (\$0.50 \cdot 34\%)/(1.08)^2]$ [46] for each dollar of financial income shifted. Next, consider the fresh-start benefit, which for the 1986 accident-year loss reserve yields a double-deduction equal to 1 minus the loss reserve discount ratio. Assuming a loss reserve discount ratio of 85 percent, an additional dollar of 1986 loss reserves reduces 1987 taxable income by \$0.15 due to the fresh-start adjustment to loss reserve discounting (see section three). The \$0.15 deduction taken in 1987 reduces the present value of tax payments by \$0.0556 $[(\$0.15 \cdot 40\%)/1.08]$. Therefore, in total, an additional dollar of 1986 loss reserves provides a net tax savings to a taxpaying firm of \$0.1846 (\$0.1290 + \$0.0556).[47] We set *MTB* equal to 0.1846 for 1986 taxpaying firm observations. However, unlike in the 1987 and 1988–1992 periods, *MTB* is not set to zero for all nontaxpaying observations (the AMT first applied in 1987). The fresh-start adjustment provides 1986 nontaxpaying firms an incentive to overstate the 1986 accident-year loss reserve estimate. Because the fresh-start adjustment effectively provides a \$0.15 double-deduction, the 1986 nontaxpaying firm's NOL carryforward is increased and a tax benefit is obtained in the year in which the deduction is realized (i.e., the year in which the firm's NOL is utilized). If the firm completely utilized its NOL carryforward before the end of the 1987 tax year, then *MTB* is set equal to 0.0556; this represents the tax benefit associated with recognizing the fresh-start benefit in 1987 $[(\$0.15 \cdot 40\%)/1.08]$. If the firm completely utilized its NOL carryforward before the end of the 1988 tax year, then *MTB* is set equal to 0.0437; this represents the tax benefit from the fresh-start benefit recognized in 1988 $[(\$0.15 \cdot 34\%)/1.08^2]$. If an NOL carryforward still remains at the end of the 1988 tax year, *MTB* is set equal to zero (0.0000). These calculations assume that firms can anticipate one or two years in advance their change from nontaxpaying to taxpaying status.

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[44] In the case of a nontaxpaying firm, an overstatement to the loss reserve becomes part of the firm's NOL. However, no tax is saved because the firm could just as easily wait and record the "additional" loss reserve in the year in which the NOL carryforward is exhausted.

[45] All of the 1987 nontaxpaying (i.e., NOL) firms also report having an NOL carryforward at the end 1986. This suggests that our 1987 nontaxpaying firms could not have carried back their 1987 NOL to obtain a current refund of prior year taxes. Thus, unlike the sample firms studied by Maydew (1997), there would have been no regular tax-based incentive for these firms to accelerate taxable deductions and/or defer taxable earnings.

[46] A loss reserve discount ratio is not required for 1986 because the 1986 loss reserve was not subject to discounting.

[47] The tax savings can also be expressed as: $\$1.00 \cdot 46$ percent $- [(\$0.50 - \$0.15)40$ percent$)/1.08] - (\$0.50 \cdot 34$ percent$)/(1.08)^2$.

To summarize, the tax incentive measure used in our empirical analysis represents the present value of the tax savings that would be realized by the firm from recognizing $1 of loss reserves in the current year rather than later. As described above, this present value per dollar for the firms in our sample will take on values in the interval [0.0000, 0.1846].

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THE ACCOUNTING REVIEW
Vol. 80, No. 1
2005
pp. 349–367

Auditor Negotiations: An Examination of the Efficacy of Intervention Methods

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ABSTRACT: Negotiations are a pervasive feature of the audit process (e.g., the resolution of proposed audit adjustments and disclosures). The results of such negotiations are of great importance to the capital markets, the client, and the auditor. The purpose of this study is to examine the effectiveness of three promising, pragmatic intervention methods for enhancing auditor negotiation performance: a role-playing intervention—assuming the client's position in a mock negotiation; a passive intervention—explicitly considering the client's interests and options; and a practice intervention—engaging in a mock negotiation prior to the client negotiation. We posit that the role-playing intervention will improve negotiation results, because this approach requires direct experience in considering and arguing the client's position and more cognitive effort in obtaining an understanding of the counterpart's position, a critical factor identified in the negotiation literature for successful performance.

Forty-five audit managers and partners were provided a realistic case based on an actual scenario involving the potential writedown of inventory due to obsolescence. Participants were randomly assigned to one of three groups (role-playing, passive, or practice) and asked to negotiate the issue with a confederate playing the role of the CFO. Auditor conservatism and a large actual subsequent writedown suggest that a significant adjustment is warranted. The results indicate that the role-playing intervention method led to an enhanced negotiation outcome (greater writedown) compared to the passive and practice groups. Process improvements on a number of dimensions were also found, particularly for the role-playing group compared to the practice group.

The case used in the research was developed through the KPMG/University of Illinois Business Measurement Case Development and Research Program. We received detailed comments on the paper from Molly Mercer, Mark Nelson, Steve Salterio, and Roger Simnett, and two anonymous referees. We also acknowledge the comments of the participants at the presentation at the International Symposium on Audit Research Sydney, American Accounting Association Annual Meeting San Antonio, American Accounting Association Auditing Section Midyear Huntington Beach, New England Behavioral Accounting Research Series, and Research Workshops at University of Alberta and Bond University. The research was supported by an Australian Research Council grant.

Editor's Note: This paper was accepted by S. Jane Kennedy, Editor.

Submitted December 2002
Accepted February 2004

Keywords: *auditor negotiations; negotiations; intervention methods; role-playing.*

Data Availability: *Data are available from the authors.*

I. INTRODUCTION

Negotiations with management are pervasive in auditing (Nelson et al. 2002; Gibbins et al. 2001) in the resolution of proposed audit adjustments (Wright and Wright 1997), in disagreements over accounting policies (Kadous et al. 2003; Salterio 1996) and financial statement disclosures (Zhang 1999), and when the auditor and management disagree over financial statement values (Nelson and Kinney 1997; Church and Zhang 1999). Negotiations also occur in determining fees and audit scope (Beattie et al. 2000).

Significant risks such as litigation, loss of client, and loss of firm reputation heighten the need for auditors to be proficient in negotiating. The auditing literature (DeAngelo 1981a, 1981b; SAS No. 47, AICPA 1984; SAS No. 82, AICPA 1997; SAS No. 99, AICPA 2002) recognizes an auditor's dual responsibility to detect misstatements or needed disclosures and then insure appropriate resolution of them. Despite recognition of this dual responsibility, however, auditing research and education have focused primarily on the first role, i.e., to design and execute appropriate audit procedures for detecting errors.

The need for effective negotiations regarding additional disclosures or potential misstatements has received limited attention even though the issue at hand often entails subjective matters. Accounting estimates, for example, are frequently dependent upon incomplete information and interpretation. The auditor and the client may differ in their evaluation of an estimate; nonetheless, both parties must come to a negotiated agreement, especially for public companies where regulators (e.g., SEC) may not allow a qualified opinion to be issued. As another illustration, the application of imprecise accounting standards also gives rise to subjectivity. The reporting of contentious matters, thus, often involves a negotiation process with the client (Gibbins et al. 2001). Concerns about effective negotiations stem from recent research that suggests a client's position may unduly influence auditors (Nelson et al. 2002; Haynes et al. 1998; Salterio and Koonce 1997; Trompeter 1994), especially in ambiguous situations. Further, the widespread practice of auditing firms sending their professional staff to training programs on negotiations recognizes the importance and the potential for improving performance in this area.

While fulfilling professional responsibilities and maintaining firm reputation are of paramount importance, effective negotiations also entail properly managing auditor-client relationships (Barlev and Goldman 1974). Poorly conducted negotiations in which the auditor "wins" a preferred position may result in ill-will, unnecessarily creating auditor/client conflict, and the potential loss of the client.

Given its importance, auditors want to have the best negotiation skills possible and, thus, approaches that enhance such skills are valuable to the firm and the profession. The purpose of this study is to examine the relative effectiveness of three negotiation facilitating methods (role-playing, passive, and practice interventions). The objective of the first two methods is to provide the auditor with an enhanced understanding of the client's interests and options. Such an understanding is essential for effective negotiations (Neale and Bazerman 1991). The practice intervention is intended to aid the auditor in more carefully formulating negotiation tactics prior to confronting the client. The use of a practice intervention in our experiment also rules out an alternative explanation for the potential benefit of the role-playing group, i.e., completing the task twice.

The major contributions of the study are as follows. First, an experimental approach is used to investigate *ex ante* the effectiveness of three negotiation intervention methods that have the potential to improve auditor negotiations. Second, the research extends the psychology/organizational behavior literatures by examining a role-playing intervention that has not been examined previously in that literature. Third, an innovative use of confederates is employed, which reduces the need for valuable professional time in our experiment. This research method has potential in other areas of audit judgment research (e.g., the review process).

Forty-five audit managers and partners from a Big 5 firm were provided with a realistic audit case involving the issue of whether inventory should be written down due to obsolescence. Participants were randomly allocated to one of three treatment groups: a role-playing treatment where they assumed the role of the CFO negotiating with an auditor; a passive treatment where they considered the client's position; and a practice treatment where they engaged in a mock negotiation as an auditor. In all treatments, the auditors then negotiated the outcome of a proposed audit adjustment with a confederate representing the Chief Financial Officer of the client.

The results revealed the role-playing intervention in particular had a significant positive impact on negotiation outcomes, as indicated by a significantly larger mean inventory write-down. In addition, after negotiations were completed, we obtained process measures of multiple dimensions of "effective" negotiations suggested in the negotiation literature. Participants, particularly in the role-playing condition, assessed an improved negotiation process on a number of these dimensions. Evidence indicated the improvements from role-playing resulted more from gains in actively considering the client's position than from learning.

The remainder of this paper is divided into four sections. Section II contains a discussion of the intervention strategies examined in the context of the negotiation literature and why these strategies appear promising in enhancing auditors' negotiation skills. Sections III and IV provide a description of the study's method and findings, while Section V is devoted to a summary of the key results and a discussion of the implications of the findings.

II. NEGOTIATION STRATEGIES AND RESEARCH HYPOTHESES

Two widely recognized approaches to negotiation from the extensive literature on this topic are: distributive (or competitive) and integrative (or collaborative) (Putnam 1990). Negotiations characterized by a distributive orientation emphasize differences and the need to win ("win-lose" orientation) and may entail utilizing pressure tactics and/or coercive processes. Distributive negotiations tend to increase conflict and attempts to gain power frequently lead to withholding information and even the exchange of incomplete or false information, lessening one's ability to obtain critical, accurate information. Distributive negotiations also increase the possibility of deadlock and hostility, reducing goodwill between negotiating parties.

Integrative negotiations, on the other hand, seek to maximize information flow and establish trust. Integrative negotiations tend to result in more systematic, open discussions, increasing one's ability to obtain information and a positive outcome without incurring ill-will (i.e., a "win-win" situation). Fundamental to integrative negotiations is the ability to understand your opponent's position (Pruitt and Lewis 1975). Information exchange and the establishment of trust are predicated on a more complete understanding of the counterpart's alternatives, interests, and options.

Auditor negotiations on accounting and disclosure issues fall into two broad categories: objective—where the proper treatment of the matter is clearly specified by existing standards, e.g., failure to accrue unpaid interest on a note payable; or subjective—where the matter entails judgment, e.g., disputes about the amount of an accounting estimate (Wright and Wright 1997). While a distributive negotiation approach may be sufficient for an auditor to appropriately deal with an objective issue, an integrative negotiation approach is likely to be more effective for subjective matters, which are commonplace in auditing and inherently expose the auditor to greater risks than objective issues. Negotiations surrounding subjective issues are the focus of this study.

A widely recognized variant of the integrative negotiation style is referred to as "Principled Negotiation" (Fisher et al. 1981; Raiffa 1982; Neale and Bazerman 1991; Plous 1993; Cialdini 1993). The Principled Negotiation method involves key underlying principles for effective negotiation. These are: interpret the problem by trying to put yourself in the other's place; define the problem in terms of the parties' interests regarding the issue at hand; seek creative options that maximize the joint gain that can be squeezed out of the situation; create efficient two-way communications; and develop a good relationship by thinking of the other as a partner in negotiations rather than an adversary. The need to understand both the counterpart's position and one's own position are fundamental to the Principled Negotiation approach (Carroll et al. 1988). Thus, to place the discussion in an audit context, the auditor must be aware of and appreciate the client's objectives, knowledge, and situation.[1]

In an auditing setting a continuing relationship between the auditor and the client is generally desired. Valley et al. (1995) review the negotiation literature dealing with situations in which there are varying strengths in relationships. They note that collaboration (integrative negotiations) is the optimal approach when each party has concerns about both their own outcome and that of the other party. With such an approach there is a greater likelihood of dealing with issues in a way that allows for an ongoing relationship. However, they observe that adoption of an integrative approach is predicated on mutual trust and strong knowledge of the other party's preferences, once again attesting to the importance of understanding the counterpart's situation.

From an extensive review of the negotiation literature, Bazerman et al. (2000) conclude that the need to know both your counterpart's situation and your own situation are fundamental to effective integrative negotiations. To accomplish this, they argue one must develop a mental model of one's negotiation counterpart encompassing consideration of several factors such as his or her goals, alternatives, preferences, and tactics.

While past negotiating experience would assist auditors in developing a mental model of one's negotiation counterpart, evidence from other areas of auditing suggest that auditors' mental models are not always accurate. For example, Kennedy and Peecher (1997) provide evidence that auditors are overconfident of their own technical knowledge and relatively inaccurate in estimating the knowledge of subordinates. Gibbins et al. (2001) also report that auditors perceive they have greater knowledge of contentious matters than the client. One concern is that auditors may not fully appreciate the client's motivations and familiarity with the company's business operations. Thus, auditors may be overconfident and enter into negotiations not fully understanding the client's interests and knowledge, potentially negotiating less than optimally.

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[1] In a game-theoretic setting Raiffa (1982) also identified the importance of accurately understanding an opponent's interests and strategies rather than assuming he is fully rational and follows the prescriptions of economic theory. Further, the negotiator himself is often not fully rational.

Negotiation research also suggests difficulties in forming an accurate mental model of another party. For instance, studies show that individuals incorrectly assume their preferences are incompatible with a counterpart (Thompson and Hrebec 1996), often fail to consider the other's perspectives (Valley et al. 1998; Samuelson and Bazerman 1985; Carroll et al. 1988), and are egocentric (Thompson and Loewenstein 1992). Thompson and Hastie (1990) and Neale and Bazerman (1985, 1983) find that unless negotiators are able to take their opponent's perspective, they are likely to underestimate the strength of their opponent's position. In addition, as discussed previously, understanding the client's interests also enhances a good working relationship and efficient communications (Tenbrunsel et al. 1999; Gelfand and Christakopoulou 1999). These communications, along with consideration of the client's position, place the auditor in a better position to negotiate and defend a proposed treatment. The importance of improving the latter is suggested by Nelson et al. (2002) who report that 30 percent of proposed adjustments are waived because the auditor could not provide convincing evidence to support the adjustment.[2]

Given the importance and difficulty of forming a mental model of a negotiation counterpart, it is thus surprising that there is little consideration of how to accomplish this. One means for obtaining a better understanding of the opponent's interests and alternatives is via perspective-taking (Galinsky and Mussweiler 2001). Perspective-taking, the active consideration of another person's viewpoint, has long been recognized as a crucial ingredient to social functioning (see review of literature by Galinsky and Moskowitz [2000]). Recent research in non-negotiation settings has shown that perspective-taking has been successful in reducing the confirmation bias (Galinsky 2000), and diminishing the accessibility of stereotypes and in-group favoritism (Galinsky and Moskowitz 2000). In a negotiation setting, Neale and Bazerman (1983) found that perspective-taking ability was a strong predictor of outcomes and negotiator behavior. Galinsky and Mussweiler (2001) found that thinking about one's opponent's alternatives in a negotiation setting reduced the anchoring effect that first offers had on final negotiations. They argue that perspective-taking gave negotiators a bargaining advantage by preventing the assimilation of final settlements to opponent's initial offers.

Galinsky and Mussweiler (2001) argue that thinking about the other side's perspective allows one to think about the other side's alternatives, which serve as their lower band, and that this information should be helpful in retrieving information that may not be consistent with the opponent's first offer. Given the anchoring effect of a first offer, considering the opponent's best alternative to a negotiated agreement can assist the negotiator in recalling information that is inconsistent with the implications of the anchor. Galinsky and Mussweiler (2001) conclude that in addition to the debiasing effects of perspective-taking, understanding the interests of one's opponent might also lead negotiators to more creative solutions that meet the interests of both negotiators, decrease impasses, and alter the type of attributions made for another negotiator's behavior.

In our study, one of the three intervention methods (i.e., passive method) uses a form of perspective-taking consistent with the psychology studies described above. However, the role-playing method described below extends the psychology and bargaining literature on the perspective approach by requiring one to actively assume the position of the other party in the negotiation.

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[2] Fifty-six percent of proposed adjustments are waived, with 17 percent due to lack of convincing support [17 percent/56 percent = 30 percent of waived adjustments].

Negotiation Intervention Methods

This study addresses three negotiation intervention methods: role-playing, a passive intervention, and a practice intervention. The major aim of the first two methods is to develop an improved mental model of a counterpart's interests, objectives, and situation. Role-playing entails having the auditor take the counterpart's place in a mock negotiation prior to the actual negotiation with the client. Under this approach the auditor "steps into the shoes" of the client and gains direct experience in considering and arguing the client's position. From this experience the auditor forms a mental template of the client's alternatives, interests, and options (Northcraft and Neale 1987). Further, from a pragmatic viewpoint, it appears that this role-playing method can be applied in the field at a relatively low cost, since it could be done, for instance, with another member of the audit team.

Industrial and organizational psychology research also suggests that role-playing will be effective in the negotiations context examined (Randolph and Posner 1979; Howell and Dipboye 1986). The primary objective of the intervention is to train auditors to focus more broadly and to consider the client's position. In extensive reviews of the training literature, Randolph and Posner (1979) and Howell and Dipboye (1986) note that role-playing has been found to be especially well suited for this purpose and more effective than passive training techniques such as lectures and handouts. Role-playing is also a widely accepted and used method in training negotiation strategies and skills.[3]

Finally, to our knowledge there have not been any auditing studies that examine ways to enhance auditor negotiations, and although prior psychology research has examined the effectiveness of various intervention methods (e.g., framing: Neale and Bazerman 1985; perspective-taking: Galinsky and Mussweiler 2001), we are not aware of studies that have directly investigated the value of a role-playing intervention. Camerer (1990) provides indirect support for the likely benefits of role-playing when he reports that in reputation games, where all subjects have the same information, those playing a certain role are better at estimating the actions of others playing the same role than those playing a different role. Thus, assuming a particular role (e.g., an auditor taking the role of a client) allows one to envision likely interests, alternatives, and actions of other individuals assuming that same role.

We refer to the second negotiation intervention method examined as passive intervention. Under this approach the auditor explicitly considers the client's interests and options prior to negotiation, but does not proactively consider the client's situation by taking their position, as in the role-playing approach. However, the passive method has a number of potential disadvantages when compared to the role-playing intervention. In the passive method the auditor engages in less cognitive effort and reasoning when taking a passive rather than an active role (Thompson and Hastie 1990). Lower involvement is more likely to result in less consideration of relevant client information (Neale and Bazerman 1983). Finally, lower active involvement reduces the opportunity for the auditor to strategically consider the client's likely negotiating position and tactics.

Again with the objective of potentially improving auditor negotiation skills, we examine a third intervention method—a practice intervention approach—where the auditor engages in a mock negotiation with a CFO confederate prior to engaging in actual client negotiations. In negotiating twice, auditors may obtain valuable task-learning effects through consideration of negotiation alternatives, options, and tactics.

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[3] For instance, a well-known negotiation and conflict resolution consulting firm, Vantage Partners of Cambridge, Massachusetts, employs this approach. See http://www.vantagepartners.com.

In comparing the practice group to the role-playing group, note that both have the advantage of a practice round but in different roles; the role-playing group takes the role of the CFO, while the practice group takes the role of the auditor. The main difference is the opportunity of the role-playing group to gain a better understanding of the other parties' position, which, as argued above, is fundamental to successful negotiation (Bazerman et al. 2000). This difference is expected to lead to improved performance for the role-playing group.

The negotiation performance expectations of the practice group vis-à-vis the passive group are less clear cut. Based on our earlier arguments the passive group has the opportunity to better understand the client's position. On the other hand, from a review of the behavioral game theory literature, Camerer (1990) notes that feedback from repeated negotiations may conceptually allow one to learn how to change strategies to achieve optimal outcomes. However, this occurs only under three conditions: feedback is clear and timely; feedback must be interpreted correctly; and individuals must change strategies correctly. Camerer (1990) observes that such conditions are rare in practice, which is likely to be the case in auditing where, for instance, feedback regarding negotiation optimality is likely to be ambiguous. Our practice intervention would enable the participants to develop some experience with the task that the passive treatment does not offer, and therefore results potentially in better judgments than the passive treatment.

Research Hypotheses

Based on the previous discussion, we posit that the negotiation outcome and process will be most enhanced by the role-playing intervention. These expectations are based on the anticipated relative benefits of each of these interventions in assisting the auditor in developing a mental model of the negotiating counterpart's interests, strategies, and options. When comparing the passive to the practice conditions, there are expected benefits of each. Specifically, the passive condition requires explicit consideration of the client's position, while the practice condition results in experiential task knowledge. Given the benefits of each, we test the null hypothesis. As such, we pose the following hypotheses concerning the three intervention methods:

H1a: The role-playing intervention method will result in an *improved negotiation outcome*, as measured by a larger negotiated write-off, when compared to the practice method.

H1b: The role-playing intervention method will result in an *improved negotiation outcome*, as measured by a larger negotiated write-off, when compared to the passive method.

H1c: There will be no difference in the negotiation outcome for the passive and practice intervention methods.

H2a: The role-playing intervention method, when compared to the practice method, will result in auditors' assessments of an *improved negotiation process*, as indicated by a greater level of satisfaction, strength of relationship, quality of communications, knowledge of mutual interests, and breadth of options.

H2b: The role-playing intervention method, when compared to the passive method, will result in auditors' assessments of an *improved negotiation process*, as indicated by a greater level of satisfaction, strength of relationship, quality of communications, knowledge of mutual interests, and breadth of options.

H2c: There will be no difference between the passive and practice intervention methods in auditors' assessments of an *improved negotiation process*, as indicated by a greater level of satisfaction, strength of relationship, quality of communications, knowledge of mutual interests, and breadth of options.

III. METHOD

The Task and Participants

In the experiment auditors are engaged in a client negotiation exercise on an actual, disguised case of a joystick manufacturer. The case used was an abbreviated version of the KPMG/University of Illinois case called "Virtual Control Corporation." The shortened version was used to allow the participants to become familiar with the case materials within 20 minutes.[4] The case involves the issue of whether to write down potentially obsolete raw materials inventory to the lower-of-cost-or-market and provides a strong context to test the effectiveness of the intervention methods for several reasons. First, although on the surface only one attribute seems at issue (i.e., the amount of the writedown), the auditor and client must consider several factors. For instance, inventory obsolescence entails an estimate that is inherently subjective. Thus, the auditor's primary goal is to ensure there is no material misstatement rather than establish a definitive writedown. This imprecision leaves room for judgment and concession. Further, *ceteris parabis*, the client and auditor wish to maintain an ongoing relationship. Thus, recognition of mutual long-term interests is important. Second, the estimate is material and could take the client from a profit to a loss position. Third, the client is contemplating an upcoming initial public offering, which greatly enhances the auditor's potential audit risk. Previous research has shown that prior to an IPO there are strong incentives for reporting higher earnings to enhance the stock selling price, and, as a result, there is evidence of significant positive earnings management (Teoh, Wong, and Rao 1998a; Teoh, Welch, and Wong 1998b). Thus, this difficult issue involves significant potential risks to the auditor. Participants are asked to negotiate and attempt to reach a resolution on the matter.

A Big 5 firm agreed to participate in the study. Partners and managers were selected as participants, since they are the primary parties involved in client negotiations. Forty-five auditors from two offices in Australia (Sydney and Melbourne) participated on a voluntary basis and were randomly assigned to the three experimental conditions, resulting in 15 per cell.[5] The participants included 13 partners and 32 managers (includes directors, senior managers, and managers) with an average of 11.26 years auditing experience and 5.41 years in their current position. Statistical tests revealed no significant demographic differences across the three treatment groups (all $p > .29$).[6]

Research Design and Procedures

Figure 1 shows the overall research design and experimental procedures. The experiment required 65 minutes on average to complete, 20 minutes each for the three phases

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[4] Some minor terminology was changed to suit Australian conditions, since, as will be described, the participants were auditors from that country.

[5] The study was conducted within a three-week time frame. There were six negotiating sessions with 4 to 15 auditors in a session. Only one session had above 10 participants. Negotiations were always completed one at a time with participants staggered throughout the day. A block randomization procedure was utilized (see Cook and Campbell 1979; Trotman 1996). This method of randomization was to avoid potential maturation effects (e.g., fatigue) that may impact treatment groups differently.

[6] The accounting rules relating to the writedown of inventory in Australia are similar to those in the U.S. While there are some regulatory differences in audit between Australia and the U.S., we are not aware of any differences that would impact the results of this study.

FIGURE 1
Research Design and Experimental Procedures

	Experimental Condition			
Phase	**Role-Playing**	**Passive**	**Practice**	**Confederate**
1. Read case	20 minutes	20 minutes	20 minutes	
2. Round 1 negotiation	20 minutes		20 minutes	Confederate 2
Passive intervention		20 minutes		
3. Round 2 negotiation	20 minutes	20 minutes	20 minutes	Confederate 1
4. Debriefing questions	5 minutes	5 minutes	5 minutes	
Total	65 minutes	65 minutes	65 minutes	

described below and five minutes for debriefing questions. All three phases were completed sequentially within this 65-minute time slot. As depicted in Figure 1, in phase 1 all groups first read the background information about the company and the current issue under negotiation, i.e., the proposed writedown of inventory. In phase 2 the role-playing group engaged in mock negotiations taking the role of the CFO. The passive intervention group was not involved in a negotiation but was asked to explicitly document the client's interests (i.e., needs and concerns) and the client's options (i.e., possible solutions) for the inventory issue. The practice group engaged in a negotiation in their normal role as auditor. In phase 3 all three treatments negotiated in their role as auditor.

The negotiations in phases 2 and 3 were conducted with a confederate. While the use of confederates is new to the accounting literature, it has been used in psychology (e.g., Wright et al. 1993; Baron et al. 1996; Waung and Highhouse 1997; Phillips and Douthitt 2001). Given the difficulties and costs of obtaining the participation of experienced auditors, our use of confederate surrogates to play the role of the negotiation counterpart greatly increases the efficiency of the research. Twice the number of participants would be required otherwise. Further, the use of the same person to negotiate across our three treatments eliminates individual differences between potential CFO negotiators and thus reduces noise in the dependent variables.

Confederate 1 was a former audit manager (at a different Big 5 firm) who had extensive auditing experience and considerable experience with a major retailer as a senior business analyst. Because auditors frequently leave their firm and assume a financial position with a client, the confederate's auditing and business background makes her a good candidate to assume the role of a CFO. She negotiated as CFO in all phase 3 negotiations, involving 45 negotiations, to insure no confounding of treatments with negotiators. She was informed by the researchers that she should negotiate a writedown that was as low as possible commensurate with the facts of the case and the arguments presented by the auditor. For example, if auditors A and B both suggested a writedown of $300,000 but A's arguments were stronger, then the confederate was more likely to agree to A's request for the $300,000 writedown.

Confederate 2 participated in phase 2 negotiations and is a research student with less than one year of Big 5 experience.[7] She took the role of auditor in the negotiations with the subjects in the role-playing group, and the role of CFO in the negotiations with the practice group and was given the same instructions as confederate 1, i.e., negotiate the lowest (highest) acceptable writedown in the role of CFO (auditor).[8]

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[7] Confederate 2 was involved in 30 negotiations. Her role was to invoke the experimental treatments, while the research hypotheses were tested by using the negotiation outcomes of confederate 1.

Our hypotheses tests involve comparing the role-playing, passive intervention, and practice groups. As discussed above, each treatment involved negotiation with the same confederate in phase 3 (confederate 1) who took the role of CFO in all treatments. Potential learning or fatigue on the part of the confederate were randomized across conditions. Finally, the confederates were unaware of the research hypotheses and the treatment conditions of the participants with whom they negotiated, because only an identification number was noted on the instrument.

Prior negotiation research has demonstrated that an individual's initial position has a large impact on subsequent negotiations (e.g., Northcraft and Neale 1987) and, thus, this variable may be a potential confounding factor. *After* the treatment conditions (but prior to final negotiations) participants were asked to indicate the amount of inventory writedown, if any, they believed was appropriate ($0 to $2,360,000 full cost of raw materials inventory). A one-way ANOVA indicates no significant differences between the three treatment groups in their initial position (F = .400; p = .673).

Prior to final negotiations, participants were provided the following ground rules: if there is some information you would have liked to have but is not provided in the case, then you may make reasonable assumptions as long as they are consistent with the basic facts in the case; you do not need to reach a final agreement; stop after 20 minutes of discussion, even if you have not reached an agreement.

The second negotiation for the practice group (phase 3) has the benefit of being a control for potential learning effects. If the role-playing group was compared to the practice group (Round 1), improved performance for role-playing may be attributed to the intervention treatment or from the experience of going through an extra round of negotiations. By comparing to the practice group's second round of negotiations in phase 3, the latter alternative explanation is eliminated.

A potential confounding factor was that the role-playing group would not only have the benefit of role-playing the CFO, but also they could learn about the key points from the auditor's point of view in the negotiations. Consequently prior to round 2 negotiations, participants for all three treatments received a summary of the key points raised by their audit team. These key points only include information already contained in the background information in the case. They were told that their audit team had identified the following issues relating to inventory obsolescence: declining market share, raw materials aging indicates old inventory (e.g., 53 percent over 6 months), inventory KPIs indicate low turnover, high conversion period, and low sales to inventories compared to competitors; only $1.5 million (63 percent) of raw materials inventory identified with current products; and a need to finalize the financial statements.

Negotiation Effectiveness (Dependent Variables)

The negotiations literature suggests "effective" negotiations in an ongoing relationship, such as an auditor and client, entail multiple dimensions. As noted earlier, the negotiation process should entail a free exchange of information, identification of a number of options, recognition of the strength of the opponent's position, and reaching a resolution (Neale and

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[8] A different confederate (confederate 1) is employed in phase 3 than in phase 2 due to the difficulty of having one individual negotiate the large number of times required for both rounds as well as the unrealistic nature of negotiating with the same person twice, especially when they have different roles. All negotiations are done on a one-on-one basis.

Bazerman 1985; Gelfand and Christakopoulou 1999; Bottom 1998). In the end, the negotiation outcome should best achieve the negotiators' objectives, and both negotiating parties should feel satisfied with the outcome (Tenbrunsel et al. 1999).

Finally, the negotiations should foster a good working relationship for the future (Gelfand and Christakopoulou 1999). After the final negotiations were concluded, the confederate was asked to indicate the outcome of the negotiations (whether an agreement was reached and, if so, what the agreed amount of the writedown was).

We expect the agreed upon write-off to be larger for the role-playing intervention group than for the other groups. While there are no normative benchmarks as to the "correct" inventory writedown for the case, a larger negotiated writedown amount is desired from the perspective of the auditor for two reasons. First, the subsequent required writedown a year later for the actual client, on which the case is based, was large (over $500,000). Second, conservatism would dictate that, given uncertainties, a larger writedown protects users of the financial statements and decreases potential litigation and loss of reputation for the auditor. Since the focus of the research is on improving the auditor's negotiation outcomes and process, this benchmark seems appropriate.

We hypothesize that the role-playing intervention, in particular, will lead to an improved negotiation process, resulting in greater satisfaction, improved client relations, better communications, better knowledge of mutual interests and a greater breadth of options. At the end of the experiment the debriefing questionnaire elicited participants' assessments of the negotiation process in phase 3. Response scales that have been validated in prior studies (Neale and Bazerman 1985; Gelfand and Christakopoulou 1999) were used, to the extent possible. These questions are listed in Exhibit 1, which provides a list of the process variables examined along with the response scale. To promote careful attention in responding, the scales for some questions were randomly ordered to reflect verbal anchors with a positive direction (negative-positive experiences) while others had a negative direction. For analysis purposes and to facilitate interpretation, negative scales were recoded to reflect a positive direction.

The debriefing questionnaire also contained the following two questions relating to the level of auditor confidence in negotiation skills: (1) For all the partners (managers) in your firm, how would you rate yourself in terms of effectiveness as a negotiator? (deciles: bottom

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EXHIBIT 1
Negotiation Process Item Wordings

1. My overall level of satisfaction with the final outcome of the negotiation was: 1 = very unsatisfied; 7 = very satisfied
2. Asked to deal with the client again, I would say: 1 = definitely yes; 7 = definitely no
3. During the negotiation process my relationship with the client: 1 = significantly deteriorated; 7 = significantly improved
4. The communications that occurred during the negotiation process can best be described as: 1 = excellent (open, candid); 7 = poor (guarded, biased)
5. In understanding the interests (needs, concerns) important to me, the client was: 1 = very inaccurate; 7 = very accurate
6. In understanding the options (possible solutions) important to me, the client was: 1 = very accurate; 7 = very inaccurate
7. The strength of the client's position is: 1 = very strong; 7 = very weak
8. During the negotiations how many options (possible solutions) were identified? 1 = few; 7 = a great many

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10 percent–top 10 percent). (2) For this round of negotiations, in the end I felt the negotiated outcome revealed that I clearly [won (= 1) to I clearly lost (= 7)].

Finally, demographic information was sought regarding title, year appointed to current position, years of auditing experience, and industry specializations.

IV. RESULTS

While our hypotheses test for differences between role-playing, passive, and practice groups, additional analysis also compares to the practice group Round 1. This treatment is a reflection of the outcome that would occur if the auditor negotiated with the client without any of our treatments and also provides us with a test of learning and the benefits of practice in negotiation. However, comparisons to the practice round 1 group should consider that it involved a different confederate than the other three groups. We discuss this further below.

Table 1, Panel A shows the mean negotiated amount of the writedown for our three treatment conditions and for practice group round 1. To test H1, a series of t-tests were conducted comparing the mean negotiated writedowns of the role-playing and practice conditions (H1a), the role-playing and passive conditions (H1b), and the passive and practice conditions (H1c).[9] The mean negotiated writedown is progressively lower for the role-playing ($300,000), passive ($257,143), and practice ($211,538) conditions respectively. t-tests show the mean writedown for the role-playing group is significantly higher than the mean writedown of the practice group ($300,000 versus $211,538; $t = 1.701$, $p = 0.05$), supporting H1a. Role-playing had an impact above and beyond that derived solely as a result of a learning effect. As shown in Table 1, Panel A, a t-test reveals the difference between the role-playing and passive conditions is not statistically significant, failing to support H1b. The passive and practice conditions are also not significantly different, consistent with the null hypothesis posed in H1c.

Because of the relatively small sample size and high variance in negotiated outcomes (potential for outliers), we also performed a regression converting the negotiated outcome into ranks with the errors adjusted for heteroscedasticity (Iman and Conover 1979). The results of this analysis are reported in Table 1, Panel B where the interventions are coded as follows: 1 = role-playing; 2 = passive; and 3 = practice. The findings reveal a marginally significant ($p = .055$) intervention effect. Specifically, the negative regression coefficient suggests a progressively smaller writedown for the role-playing, passive, and practice interventions.[10]

Hypotheses 2a, 2b, and 2c examine the impact of the intervention methods on the negotiation process. Table 2 presents participants' assessments of their experiences during the negotiation process, as measured by a number of variables. Hypotheses 2a and 2b posit that role-playing will result in a better negotiation process than the practice and passive groups respectively. Hypothesis 2c posits no difference between the passive group and the practice group in the negotiation process. While the means for the role-playing group are higher than the other groups on seven of the eight dimensions (exception: "strength of client position"), a series of comparison t-tests indicate that three of these differences are

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[9] An additional set of ANCOVA analyses was performed to determine whether the findings are affected by the auditors' years of experience and level (partner or manager). The primary results for both analyses remain the same. Years of experience was not a significant covariate ($p > .10$), while title was marginally significant ($p = .09$) with partners negotiating a larger writedown than managers, on average.

[10] To examine the robustness of the findings, we also ran a nonparametric summed ranks test to test the intervention effect. The summed ranks for the three interventions were as follows: role-play, 341.5; passive, 292; and practice, 227.5 ($z = -1.52$; $p = .065$), again suggesting a progressively smaller writedown for the role-playing, passive, and practice interventions.

TABLE 1
Negotiated Outcome

Panel A: Agreed Inventory Writedown

	n[a]	Mean	Std. Dev.[b]
Role-playing	14	$300,000	$134,450
Passive Intervention	14	257,142	146,573
Practice Round 1	10	114,000	147,908
Practice Round 2	13	211,538	135,637

Comparison t-tests: Inventory Writedown[c]

	Passive Intervention	Practice Round 1	Practice Round 2
Role-playing	.806, p = .427	3.206, p = .002	1.701; p = .050
Passive Intervention		2.350, p = .014	.837; p = . 410
Practice Round 1			1.644; p = .057

Panel B: Rank Regression of Negotiated Outcome[d]

Variable	Coefficient	Robust Std. Error	t-statistic	p-value
Constant	27.811	4.546		
Intervention	−3.448	2.111	−1.63	.055
$R^2 = 0.06$				

[a] There are 15 participants in each group. The sample size (n) reflects the number that reached an agreement as to a write-down amount. One subject in practice round 2 reached a negotiation agreement but did not give an initial position. Excluding this individual from the analyses does not affect overall conclusions.

[b] Levine's statistic was used to test for equality of variances. No significant differences were noted.

[c] t-tests are one-tailed where direction is as expected, otherwise two-tailed.

[d] The interventions are coded as follows: 1 = role-playing; 2 = passive; and 3 = practice.

statistically significant.[11] With respect to H2a, the role-playing group led to an improved negotiation compared to the practice group in terms of "satisfaction with negotiation outcome" (p = .008), "desirability of future dealings" (p = .045), and "counterpart understanding of options" (p = .089). Thus, H2a is supported. In comparing the negotiation processes of the role-playing and passive groups (H2b), the role-playing group assessed the "counterpart understanding of options" higher (p = .043). This was the only dimension on which H2b was supported. With respect to H2c, the only significant difference between the passive group and practice group is for the "satisfaction with negotiation outcome" variable (p = .027); the passive group assessment is significantly higher, providing some evidence

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[11] The variable in which the role-playing group was lower is "strength of the client position." While the differences are not significant, future research could investigate the impact of role-playing on understanding the strength of the client's position.

TABLE 2
Participant Assessments of the Negotiation Process
[Mean (s.d.)]
Experimental Group

Variable[a,b]	**Role-Playing**	**Passive**	**Practice**
Satisfaction with negotiation outcome	5.33[1] (0.98)	5.07[1] (0.96)	4.07[1] (1.67)
Desirability of future dealings	6.40[2] (0.63)	6.13 (0.74)	5.87[2] (.99)
Change in client relationship	4.73 (0.96)	4.53 (0.74)	4.67 (.90)
Quality of communications	5.40 (1.59)	5.20 (0.86)	4.87 (.92)
Counterpart understanding of interests	5.13 (1.06)	5.07 (0.96)	4.60 (1.30)
Counterpart understanding of options	5.40[3] (0.91)	4.80[3] (0.94)	4.87[3] (1.19)
Strength of client position	4.33 (1.18)	4.73 (1.22)	5.00 (1.25)
Number of options identified	3.47 (1.19)	2.93 (1.03)	2.93 (1.33)

[a] See Exhibit 1 for scales for each variable. All negative scales (high-low) were recoded to reflect a positive scale.

[b] Levine's statistic was used to test for equality of variances. The only significant difference noted is "Satisfaction with negotiation outcome"; Levine's statistic 2.85 (significance = .069).

[1] Role-playing and passive are both significantly different to practice (t = 2.539; p = 0.008; t = 2.012; p = 0.027, respectively)

[2] Role-playing is significantly different to practice (t = 1.758; p = 0.045)

[3] Role-playing is significantly/marginally significantly different to passive and practice (t = 1.775; p = 0.043; t = 1.381; p = 0.089, respectively)

of a comparative advantage in the negotiation process for this condition over the practice condition.[12]

Additional Analysis

Assuming that intervention or practice prior to negotiation is uncommon in auditing, we compare the negotiation outcomes for our three treatments to practice round 1 outcomes.

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[12] To test the robustness of the findings regarding participants' assessments of the negotiation process, we also conducted a factor analysis of the eight individual response variables using the principal component analysis extraction method and Varimax rotation. This analysis revealed two clear factors: relationship with client; and understanding of interests and options. For brevity these factors are referred to as "relationship" and "interests/options." Relationship was composed of four variables: overall satisfaction with outcome; asked to deal with client again; strength of client relationship; and level of communications; while interests/options included three variables: understanding interests, understanding options, and number of options. A series of t-tests of the factor scores (summed variable responses) revealed a significantly higher assessment of relationship (t = 2.066; p = .024) as well as a marginally significant higher assessment of interests/options (t = 1.558; p = .065) for the role-playing condition than the practice condition (H2a). In examining H2b, there was no significant difference for the role-playing and passive conditions for relationship (t = .858; p = .398) and a marginally significant higher assessment of interest/options for the role-playing condition (t = 1.260; p = .10). Finally, (H2c) there was a marginally significant higher assessment of relationship for the passive condition than the practice condition (t = 1.516; p = .071) and no significant difference for interests/options (t = .381; p = .706). In all, the factor analysis findings corroborate those reported previously for the individual negotiation process variables.

This comparison provides an indication of the potential value of the interventions to present audit practice. The comparison of the practice round 1 with the practice round 2 responses also provides an indication of learning. However, care must be taken in interpreting these findings because, as discussed previously, a different confederate was used in round 1 (see research methods section) than in our three treatment groups.

Table 1, Panel A shows the mean inventory writedowns. Role-playing, passive, and practice round 2 groups negotiated a larger writedown than the practice round 1 group (role-playing versus practice Round 1: $t = 3.206$; $p = .002$; passive versus practice round 1: $t = 2.350$; $p = .014$; practice round 2 versus practice round 1: $t = 1.644$; $p = .057$), indicating that all treatment conditions resulted in improved negotiation outcomes.[13,14]

Another measure related to the quality of the negotiation outcome is the frequency of a negotiated agreement versus an impasse. In the role-playing and passive intervention groups agreement was reached 93 percent of the time, compared to 87 percent for the practice round 2 group and 67 percent for the practice round 1 group. The rate of agreement for the practice round 1 group is significantly lower ($\chi^2 = 5.272$, $p = .02$) than the pooled treatment participants. Again, this result could be due to no intervention or to the different confederate.[15]

V. DISCUSSION

Client negotiations are pervasive in auditing and have substantial potential impact on a number of parties, including the capital markets, regulators, and the auditor and auditing firm. For instance, while there are many potential explanations for audit failures (including lack of independence), an improper concession to management in a negotiation may lead to earnings management with accompanying over-reliance on reported results and subsequent potential investor losses and auditor litigation and loss of reputation (Levitt 2000; Nelson et al. 2002).

This experimental study examines the effectiveness of three negotiation intervention methods (role-playing, passive consideration of the client's interests and options, and practice) in assisting auditors to achieve a desirable outcome and process. This is the first study to directly test the efficacy of methods to enhance the auditor negotiation process and the first to empirically test a role-playing intervention.

Although there are no normative benchmarks available as to the "correct" inventory writedown, conservatism, coupled with the large actual subsequent writedown, suggest a significant adjustment is warranted. The results reveal that the role-playing group, on average, negotiated a greater inventory writedown than the practice group. This result suggests there are incremental benefits from role-playing. In addition, evidence suggests that the writedown becomes larger as we move from the practice group to the passive group to the

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[13] When all four conditions are included in an overall ANOVA, the results indicate a significant difference in negotiated amount across the treatments ($F = 3.693$; $p = 0.018$).

[14] Comparisons were also made between the practice round 1 group and the three treatment groups with respect to process outcomes. t-tests revealed the role-playing intervention significantly enhanced assessments regarding satisfaction with client outcome, desirability of future dealings and the clients' understanding of their options. Only satisfaction with the negotiation outcome was significant for the comparison of the passive group with the practice round 1 group. There were no significant differences in assessments between the practice group's round 1 and round 2 responses. While care needs to be exercised in making the above comparisons because of the different confederate used in round 1, this factor is unlikely to be the explanation for the findings as there were no differences between round 1 and round 2 process results.

[15] We also examined how the final negotiated amount differed from the auditor's initial position, referred to as the "concession" given up during the negotiation. The results of comparison t-tests show both a significantly higher initial position as well as concession for the practice group round 1 than the role-playing, passive, and practice round 2 conditions ($p < .01$), with no significant differences among the three intervention conditions.

role-playing group. This finding suggests that gaining an understanding of the client's position, as obtained through role-playing or passive intervention, leads to improvements in negotiations.

Participant assessments of their experiences also suggest that the role-playing and passive intervention methods improve the negotiation process along a number of dimensions. The main differences were between the role-playing group and the practice group, with role-playing resulting in improved satisfaction with the negotiation outcome, increased desirability of future dealings with the client, and a belief that the client had a better understanding of the options important to the auditor.

The comparisons between rounds 1 and 2 for the practice group where an auditor negotiated twice with two different confederates (both taking the CFO's role) suggest benefits of practice sessions. However, given our earlier results on role-playing, we suggest that if audit firms are going to invest time in practice sessions, then there are incremental benefits of that practice involving role-playing the client over having a practice in the auditor role only.

The study employs an innovative method to conduct negotiation research with the use of nonauditor confederates. This approach greatly reduces the number of costly auditor participants required and is worthy of further consideration in other auditing judgment research that involves the interactions of multiple parties. For instance, studies examining the impact of the review process could employ confederates to play the role of either the reviewer or reviewee.

This research has important implications for practice and future research. The intervention methods, and in particular the role-playing method, are promising vehicles for firms to consider adopting. In addition to their positive performance effects, these methods entail little cost to implement. Field data of the efficacy of these methods is needed to corroborate the findings. Since this is the first study to examine the effectiveness of the intervention methods on auditor negotiations, additional research is also needed to corroborate and extend the work here. The research focuses on one issue (a subjective inventory writedown) and on participants from a single firm. Further work could explore the robustness of the findings when the negotiations involve other issues and other audit firms.

Future research could also investigate whether some general negotiation practice coupled with thinking about client's incentives and options are equivalent to the role-playing intervention. Both the number of negotiations and passive versus active role-playing could be considered. Similarly, future research would also benefit from a more in-depth analysis of the role of the initial position of the negotiators. For example, the initial position could be manipulated by instructions from an experienced partner or by the stand taken by the confederate in the first round of negotiations.

Results suggest that partners negotiated a larger writedown than managers. While rank did not interact with treatment, future research should explicitly examine the relationship between various measures of experience (including negotiation experience) on the impact of different intervention methods. Some intervention methods may be more beneficial to inexperienced negotiators by providing knowledge not already possessed by these negotiators.

Potentially a number of factors may impact negotiation outcomes including the issue being negotiated, levels of risk, familiarity of parties in the negotiation process, previous negotiation training, relative experience and knowledge of the negotiating parties, incentives of the parties, the level of subjectivity of the issue, and the precision of the related standards, etc. Future research may extend the current study by exploring the moderating effects of these factors as well as considering multiperiod effects and multiple negotiation parties (e.g., the auditor, a second partner review, the CFO, and the audit committee).

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Editorial Data

The following table contains information about turnaround time for manuscripts (including revisions) on which editorial decisions were made in the 12-month period ended August 31, 2004. Turnaround time is the number of days between the date that the manuscript was received *and the date of the editor's letter to the author(s)*:

	Number of Manuscripts	Percent	Cumulative Number	Cumulative Percent
0 ≤ Days ≤ 30	65	16.46	65	16.46
31 ≤ Days ≤ 60	145	36.71	210	53.16
61 ≤ Days ≤ 90	118	29.87	328	83.04
91 ≤ Days ≤ 120	56	14.18	384	97.21
121 ≤ Days	11	2.78	395	100.00
Total	395	100.00		

The mean review time was 60.68 days; the median review time was 59 days.

New Submissions by calendar year (January 1 to December 31)

1992	241
1993	234
1994	231
1995	195
1996	230
1997	195
1998	196
1999	239
2000	260
2001	260*
2002	324
2003	327
2004 Aug 31	210 (8 mths)

* 2001—in addition to the 260 regular submissions, 68 MSs were submitted to the *TAR* Quality of Earnings Conference.

The **acceptance rate** (defined as number of MSs accepted divided by the number of new submissions) over the past 5 years is between 10–13% per year.

EDITORIAL POLICY AND STYLE INFORMATION

EDITORIAL POLICY

According to the policies set by the Publications Committee (which were endorsed by the Executive Committee and were published in the *Accounting Education News*, June 1987), *The Accounting Review* "should be viewed as the premier journal for publishing articles reporting the results of accounting research and explaining and illustrating related research methodology. The scope of acceptable articles should embrace any research methodology and any accounting-related subject, as long as the articles meet the standards established for publication in the journal ... No special sections should be necessary. The primary, but not exclusive, audience should be—as it is now—academicians, graduate students, and others interested in accounting research."

The primary criterion for publication in *The Accounting Review* is the significance of the contribution an article makes to the literature.

The efficiency and effectiveness of the editorial review process is critically dependent upon the actions of both authors submitting papers and the reviewers. Authors accept the responsibility of preparing research papers at a level suitable for evaluation by independent reviewers. Such preparation, therefore, should include subjecting the manuscript to critique by colleagues and others and revising it accordingly prior to submission. The review process is not to be used as a means of obtaining feedback at early stages of developing the research.

Reviewers and associate editors are responsible for providing critically constructive and prompt evaluations of submitted research papers based on the significance of their contribution and on the rigor of analysis and presentation. Associate editors also make editorial recommendations to the editor.

MANUSCRIPT PREPARATION AND STYLE

The Accounting Review's manuscript preparation guidelines follow (with a slight modification) the B-format of *The Chicago Manual of Style* (14th ed.; University of Chicago Press). Another helpful guide to usage and style is *The Elements of Style*, by William Strunk, Jr., and E. B. White (Macmillan). Spelling follows *Webster's Collegiate Dictionary*.

FORMAT

1. All manuscripts should be typed in 12-point font on one side of 8½ × 11" good quality paper and be double-spaced, except for indented quotations.
2. Manuscripts should be as concise as the subject and research method permit, generally not to exceed 7,000 words.
3. Margins of at least one inch from top, bottom, and sides should facilitate editing and duplication.
4. To promote anonymous review, authors should not identify themselves directly or indirectly in their papers or in experimental test instruments included with the submission. Single authors should not use the editorial "we."
5. A cover page should show the title of the paper, the author's name, title and affiliation, email address, any acknowledgments, and a footnote indicating whether the author would be willing to share the data (see last paragraph in this statement).

Pagination: All pages, including tables, appendices and references, should be serially numbered. Major sections should be numbered in Roman numerals. Subsections should not be numbered.

Numbers: Spell out numbers from one to ten, except when used in tables and lists, and when used with mathematical, statistical, scientific, or technical units and quantities, such as distances, weights and measures. For example: *three days; 3 kilometers; 30 years*. All other numbers are expressed numerically.

Percentages and Decimal Fractions: In nontechnical copy use the word percent in the text.

Hyphens: Use a hyphen to join unit modifiers or to clarify usage. For example: *a well-presented analysis; re-form*. See *Webster's* for correct usage.

Keywords: The abstract is to be followed by four keywords that will assist in indexing the paper.

ABSTRACT/INTRODUCTION

An Abstract of about 100 words should be presented on a separate page immediately preceding the text. The Abstract should concisely inform the reader of the manuscript's topic, its methods, and its findings. Keywords and the Data Availability statements should follow the Abstract. The text of the paper should start with a section labeled "I. Introduction," which provides more details about the paper's purpose, motivation, methodology, and findings. Both the Abstract and the Introduction should be relatively nontechnical, yet clear enough for an informed reader to understand the manuscript's contribution. The manuscript's title, but neither the author's name nor other identification designations, should appear on the Abstract page.

TABLES AND FIGURES

The author should note the following general requirements:

1. Each table and figure (graphic) should appear on a separate page and should be placed at the end of the text. Each should bear an Arabic number and a complete title indicating the exact contents of the table or figure. Tables and figures should define each variable. The titles and definitions should be sufficiently detailed to enable the reader to interpret the tables and figures without reference to the text.
2. A reference to each graphic should be made in the text.
3. The author should indicate by marginal notation where each graphic should be inserted in the text.
4. Graphics should be reasonably interpreted without reference to the text.
5. Source lines and notes should be included as necessary.

Equations: Equations should be numbered in parentheses flush with the right-hand margin.

DOCUMENTATION

Citations: Work cited should use the "author-date system" keyed to a list of works in the reference list (see below). Authors should make an effort to include the relevant page numbers in the cited works.

1. In the text, works are cited as follows: authors' last name and date, without comma, in parentheses: for example, (Jones 1987); with two authors: (Jones and Freeman 1973); with more than two: (Jones et al. 1985); with more than one source cited together (Jones 1987; Freeman 1986); with two or more works by one author: (Jones 1985, 1987).
2. Unless confusion would result, do not use "p." or "pp." before page numbers: for example, (Jones 1987, 115).
3. When the reference list contains more than one work of an author published in the same year, the suffix a, b, etc. follows the date in the text citation: for example, (Jones 1987a) or (Jones 1987a; Freeman 1985b).
4. If an author's name is mentioned in the text, it need not be repeated in the citation; for example, "Jones (1987, 115) says ..."
5. Citations to institutional works should use acronyms or short titles where practicable; for example, (AAA ASOBAT 1966); (AICPA Cohen Commission Report 1977). Where brief, the full title of an institutional work might be shown in a citation: for example, (ICAEW *The Corporate Report* 1975).
6. If the manuscript refers to statutes, legal treatises or court cases, citations acceptable in law reviews should be used.

Reference List: Every manuscript must include a list of references containing only those works cited. Each entry should contain all data necessary for unambiguous identification. With the author-date system, use the following format recommended by *The Chicago Manual*:

1. Arrange citations in alphabetical order according to surname of the first author or the name of the institution responsible for the citation.
2. Use author's initials instead of proper names.
3. Date of publication should be placed immediately after author's name.
4. Titles of journals should not be abbreviated.
5. Multiple works by the same author(s) in the same year are distinguished by letters after the date.
6. Inclusive page numbers are treated as recommended in *Chicago Manual* section 8.67.

Sample entries are as follows:

American Accounting Association, Committee on Concepts and Standards for External Financial Reports. 1977. *Statement on Accounting Theory and Theory Acceptance.* Sarasota, FL: AAA.

Demski, J. S., and D. E. M. Sappington. 1989. Hierarchical structure and responsibility accounting. *Journal of Accounting Research* 27 (Spring): 40–58.
Dye, R., B. Balachandran, and R. Magee. 1989. Contingent fees for audit firms. Working paper, Northwestern University, Evanston, IL.
Fabozzi, F., and I. Pollack, eds. 1987. *The Handbook of Fixed Income Securities.* 2nd edition. Homewood, IL: Dow Jones-Irwin.
Kahneman, D., P. Slovic, and A. Tversky, eds. 1982. *Judgment Under Uncertainty: Heuristics and Biases.* Cambridge, U.K.: Cambridge University Press.
Porcano, T. M. 1984a. Distributive justice and tax policy. *The Accounting Review* 59 (October): 619–636.
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Shaw, W. H. 1985. Empirical evidence on the market impact of the safe harbor leasing law. Ph.D. dissertation, The University of Texas at Austin.
Sherman, T. M., ed. 1984. *Conceptual Framework for Financial Accounting.* Cambridge, MA: Harvard Business School.

Footnotes: Footnotes are not used for documentation. Textual footnotes should be used only for extensions and useful excursions of information that if included in the body of the text might disrupt its continuity. Footnotes should be consecutively numbered throughout the manuscript with superscript Arabic numerals. Footnote text should be doubled-spaced and placed at the end of the article.

SUBMISSION OF MANUSCRIPTS

Authors should note the following guidelines for submitting manuscripts:

1. Manuscripts currently under consideration by another journal or publisher should not be submitted. The author must state that the work is not submitted or published elsewhere.
2. In the case of manuscripts reporting on field surveys or experiments, four copies of the instrument (questionnaire, case, interview plan, or the like) should be submitted. Information that might identify the author(s) must be deleted from the instrument.
3. MS should be submitted via email as Microsoft® Word or PDF files to the *TAR* office at taruw@u.washington.edu. A submission letter, a separate cover page, and the MS containing no author identification should be emailed as separate files. The submission fee should be paid online (VISA or MasterCard only) at: https://aaahq.org/AAAforms/journals/tarsubmit.cfm. If unable to pay online, a check in U.S. funds, made payable to the American Accounting Association, may be sent to Professor Terry Shevlin, Senior Editor *TAR*, School of Business, Box 353200, University of Washington, Seattle, WA 98195-3200. The submission fee in U.S. funds is $125.00 for members and $200.00 for nonmembers of the AAA. Effective January 1990, the submission fee is nonrefundable.
4. The author should retain a copy of the paper.
5. Revisions must be submitted within 12 months from request, otherwise they will be considered new submissions.

COMMENTS

Comments on articles previously published in *The Accounting Review* will be reviewed (anonymously) by two reviewers in sequence. The first reviewer will be the author of the original article being subjected to critique. If substance permits, a suitably revised comment will be sent to a second reviewer to determine its publishability in *The Accounting Review*. If a comment is accepted for publication, the original author will be invited to reply. All other editorial requirements, as enumerated above, also apply to proposed comments.

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POLICY ON DATA AVAILABILITY

The following policy has been adopted by the Executive Committee in its April 1989 meeting. "An objective of (*The Accounting Review, Accounting Horizons, Issues in Accounting Education*) is to provide the widest possible dissemination of knowledge based on systematic scholarly inquiries into accounting as a field of professional research, and educational activity. As part of this process, authors are encouraged to make their data available for use by others in extending or replicating results reported in their articles. Authors of articles which report data dependent results should footnote the status of data availability and, when pertinent, this should be accompanied by information on how the data may be obtained."

JANUARY 2005 PLACEMENT ADS

The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication. The ***Review*** *is published on the first day of January, April, July, and October. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 34233-2399, ATTENTION: ADVERTISING DEPT. All replies to box numbers should be on separate sheets to facilitate forwarding.*

101 IOWA STATE UNIVERSITY, Department of Accounting, invites applications for a tenure-track appointment to begin in Fall 2005. Applications for Assistant, Associate, or Professor will be considered. Applicants should possess the commitment and demonstrable ability to be productive scholars and excellent teachers. All areas of accounting are highly encouraged to apply, but the strongest teaching need is in Tax. Minimum requirements include an earned doctorate or expected completion of the doctoral degree prior to the beginning of the appointment. At the Associate Professor or Professor level, demonstrated achievement in scholarly research is expected. The teaching load will be designed to allow time for scholarly activities in addition to teaching. Applications should be sent to Dr. Richard B. Carter, Iowa State University, Department of Accounting, 2333 Gerdin Building, Ames, Iowa 50011-1350, or via email to rbcarter@iastate.edu. Submit current *curriculum vitae,* a working paper, and names and addresses of three references.

102 SAN JOSE STATE UNIVERSITY invites applications for Fall 2005 for three tenure-track Accounting positions as Associate, Assistant, Professor, or temporary appointment as Visiting Professor with an emphasis in Financial Accounting and Audit, and Taxation. The candidate must have demonstrated versatility in subject matter competencies and pedagogy. The teaching assignment is at both graduate and undergraduate levels including traditional and accelerated formats. The positions are subject to final approval by the University. The minimum credential requirement is Ph.D. for tenure-track appointments. Strong preference will be given to candidates who hold a Ph.D. from an AACSB-accredited university. The application deadline is December 31, 2004 or until the position is filled. Send application letter, *curriculum vitae,* teaching evaluations, and three letters of reference to Dr. Joseph Mori, College of Business, San Jose State University, One Washington Square, BT850, San Jose, CA 95192-0066; Telephone: (408) 924-3461; Email: mori_j@cob.sjsu.edu. San Jose State University is an Equal Opportunity/Affirmative Action Employer.

103 SOUTHEAST MISSOURI STATE UNIVERSITY, Department of Accounting and MIS, invites applications for a tenure-track position available August 2005 as Instructor or Assistant/Associate Professor of Accounting. Primary teaching opportunities are in all areas of Accounting. Normal teaching load is 9 hours per semester and may involve ITV and online instruction. REQUIRED: Ph.D./D.B.A. in Accounting (ABD considered), strong communication and interpersonal skills, demonstrated potential for very effective teaching and high-quality scholarly work; also demonstrated commitment to working with multicultural populations and awareness of issues affecting women and minorities. Send letter of application, resume, and names and telephone numbers of three references to Dr. Carolyn Rainey, Search Chair, Southeast Missouri State University, 260 Dempster Hall, MS 5815, Cape Girardeau, MO 63701; Office Phone: (573) 651-2121; Email: crainey@semo.edu; Fax: (573) 651-2992. Review of applications will begin September 30 and will continue until the position is filled. Southeast Missouri State University is an Equal Opportunity, Affirmative Action Employer.

104 RICE UNIVERSITY, Jones Graduate School of Management, invites applications for a tenure-track faculty position in Financial Accounting commencing Fall 2005. Candidates must have a Ph.D. or be near completion, and should demonstrate strong potential for excellence in scholarly research and teaching. Rice offers an excellent environment for junior faculty, including competitive compensation levels and attractive teaching loads. Applicants should send their *curriculum vitae*, three recommendation letters, and copies of recent research and/or dissertation proposal to Ms. Annepha Pemberton, Jones Graduate School of Management, Rice University, PO Box 2932, Houston, TX 77252-2932. Rice University is an Equal Opportunity/Affirmative Action Employer and actively encourages applications from women and underrepresented groups.

105 DARTMOUTH COLLEGE'S graduate school of management, the Tuck School of Business at Dartmouth, anticipates faculty searches in Accounting. We are open to all levels of appointment—Assistant Professor, Associate Professor, or Full Professor, however, there is a preference for those who have at least three years of experience since completing their Ph.D. We are interested in candidates who will produce research of excellent quality that will have high impact on the field. There must be evidence that the candidate can conduct research and teach at a level of quality consistent with Tuck's high standards. Send resumes to Senior Associate Dean Robert G. Hansen, Tuck School of Business at Dartmouth, 100 Tuck Hall, Hanover, NH 03755. Dartmouth College is an Equal Opportunity, Affirmative Action Employer. Women and minorities are encouraged to apply.

106 UNIVERSITY OF WASHINGTON, TACOMA, the Milgard School of Business, invites applicants for a tenure-track position in Accounting at the Assistant/Associate/Full Professor rank for Autumn 2005. All areas of specialization within Accounting will be considered. Applicants must have a Ph.D. in Accounting. Professional certification is desirable. Applicants must have a commitment to excellence in scholarship and teaching. Individuals applying at the Associate/Full Professor rank must have an established record of publications in quality academic journals, demonstrated excellence in teaching, and a commitment to service. Interested candidates should submit a *curriculum vitae*, a letter of interest, and the names of three references. The review of application materials will begin immediately. The position is open until filled. Additional information is available at: http://www.tacoma.washington.edu/business. Send application materials to Shahrokh M. Saudagaran, Dean, Milgard School of Business, University of Washington, Tacoma, Finance & Administration Office, Box 358431, 1900 Commerce Street, Tacoma, WA 98402-3100; Email: tfaculty@u.washington.edu. The University of Washington, an Equal Opportunity/Affirmative Action Employer, is building a culturally diverse faculty and strongly encourages applications from women and minority candidates.

107 FORDHAM UNIVERSITY, the Schools of Business (AACSB-accredited), invites applications for tenure-track Assistant/Associate Professor positions in Accounting starting in Fall 2005. The candidate must have received an earned doctorate in Accounting or a related area or evidence of ability to complete the degree before August 2005 and a strong commitment to teaching and research. The candidate for Associate Professor must have a track record of success in research and teaching. Applications, including *curriculum vitae*, or any inquiries or nominations regarding these positions, should be sent to Professor Allen Schiff, Accounting Area Chair, Schools of Business, Fordham University, 113 West 60th Street, New York, NY 10023; Email: Schiff@fordham.edu; Fax: (212) 765-5573. Fordham University is an independent, Catholic university in the Jesuit tradition and welcomes applications from men and women of all backgrounds. Fordham University is an Affirmative Action/Equal Opportunity Employer.

108 WASHINGTON STATE UNIVERSITY invites applications for an Assistant Professor of Accounting, but rank is open and a Distinguished Professor position is available for the right candidate, in the area of Cost and Managerial Accounting that is available beginning August 16, 2005. A doctorate, or ABD, in Accounting is required, as well as a record of published research or research potential, and effective teaching. A research interest in Managerial Accounting is desirable. Experience teaching Cost/Managerial Accounting is highly desirable. Position includes a six-hour teaching load, summer research support, competitive salary, and excellent fringe benefits. Review of applications begins October 29, 2004 and continues until the position is filled. Send letter of application, resume, student teaching evaluations (or summary), recent research paper, and three letters of recommendation to Accounting Search Chair; Department of Accounting; Box 644729; Washington State University; Pullman, WA 99164-4729. WSU is an EO/AA Educator and Employer. Protected groups are encouraged to apply.

109 UNIVERSITY OF NOTRE DAME, Department of Accountancy, invites applications for position openings at the Assistant and Associate Professor levels. All research areas will be considered. Applicants for Assistant Professor positions should expect to complete doctoral degree requirements before the start of the contract period. All candidates should have a strong commitment to scholarly research and excellence in teaching. Salary is very competitive and research support is excellent. Please send *curriculum vitae* and an example of scholarly work to Professor Tom Schaefer, Chair, Department of Accountancy, Room 102D, Mendoza College of Business Administration, University of Notre Dame, Notre Dame, IN 46556-5646. The University of Notre Dame is an Equal Opportunity, Affirmative Action Employer.

110 MIAMI UNIVERSITY, Department of Accountancy, invites applicants for a tenure-track position at the Assistant or Associate Professor level beginning August 2005. Applicants with an interest in Financial Accounting or Accounting Systems will be given primary consideration. Applicants must have a doctorate in Accounting or dissertation in process with expectation of completion of degree by December 31, 2005. In addition to teaching excellence, faculty members are expected to conduct and publish research. Candidates for advanced rank must demonstrate significant accomplishment in teaching, research, and service. Please submit your resume and letters from three references to Dr. Peter Brewer, Department of Accountancy, Miami University, Oxford, OH 45056; Email: brewerpc@muohio.edu. Miami University has a national reputation for quality teaching. Both the undergraduate and graduate programs are AACSB-accredited. Information about the faculty and curriculum is available at: http://www.sba.muohio.edu. Miami University is an EEO Employer. Women and minorities are encouraged to apply.

111 TEXAS A&M UNIVERSITY–KINGSVILLE (http://www.cba.tamuk.edu), College of Business Administration, invites applications for a full-time tenure- track faculty position in Accounting at the Assistant or Associate level. The successful applicant will teach junior- and senior-level core courses in Accounting. A doctorate, from a regionally accredited institution or university, in the teaching field or a closely related area is preferred, but ABDs will be considered if close to completion. Research, publication, teaching, and service performance consistent with ACBSP and AACSB accreditation requirements is required. CPA certification is preferred. Applicants at the Associate Professor level must demonstrate a record of accomplishment appropriate to that rank. Send a letter of application, resume, and three letters of recommendation to Office of the Dean, College of Business Administration, Texas A&M University–Kingsville, MSC 182, Kingsville, TX 78363. EOE.

112 CALIFORNIA STATE UNIVERSITY, LONG BEACH, invites applicants for a tenure-track Accounting faculty position, Assistant Professor level, for Fall 2005. Applicants must hold a Ph.D. or a D.B.A. degree with a major in Accounting and have demonstrated potential for excellence in teaching, research, curriculum development, and service contributions. Professional certification is desirable. Compensation will be competitive and be commensurate with the candidate's qualifications and experience. Applicant screening will begin October 4, 2004 and will continue until the position is filled. Please send a letter of application and *curriculum vitae* to Steven A. Fisher, Chair, Department of Accountancy, California State University, Long Beach, 1250 Bellflower Boulevard, Long Beach, CA 90840-8504. CSULB is an urban university in the California State University System. It is located three miles from the ocean in the city of Long Beach. CSULB is an Affirmative Action/Equal Opportunity Employer and has a strong commitment to the principle of diversity.

113 UNIVERSITY OF UTAH, School of Accounting and Information Systems, is recruiting for a new tenure-track faculty member in Accounting at an Assistant/Associate rank in any area of specialization beginning in the 2005–2006 academic year; pending funding and University approval. Applicants should possess a doctorate or be close to completion. Rank will be considered subject to qualifications. Salaries, research support, and teaching loads are competitive and fringe benefits are excellent. The School of Accounting and Information Systems and the David Eccles School of Business are both accredited at the undergraduate and graduate levels by the AACSB. Bachelor's, M.B.A., Master's of Accounting, and Ph.D. programs are offered. The application deadline is January 15, 2005 or until the position is filled. Please send application including dissertation proposal or working paper, *curriculum vitae,* and three letters of reference to David Plumlee, Director, School of Accounting and Information Systems, 1645 E Campus Center Dr., Room 108, University of Utah, Salt Lake City, Utah 84112. The University of Utah is an Equal Opportunity, Affirmative Action Employer, encourages applications from women and minorities, and provides reasonable accommodation to the known disabilities of applicants and employees.

114 KENT STATE UNIVERSITY, Department of Accounting, invites applications for an Associate Professor with teaching emphasis in Managerial Accounting beginning in Fall 2005. The successful candidate will also serve as a KPMG Faculty Fellow. Candidates must have a high-quality, established research record. A Ph.D. with a major in Accounting or an appropriate related field is required. Professional certification such as CPA or CMA is highly desirable. All candidates must be able to demonstrate evidence of discovery/integration research and of effective undergraduate and graduate teaching. Research will be expected in high-quality, academic refereed journals for reappointment, tenure, and promotion. Participation in teaching doctoral students and serving on and/or supervising their dissertations will be an important part of the faculty member's responsibilities. Review of applications will begin immediately and continue until the position is filled. If you are interested in this position, please contact and/or mail a copy of your *curriculum vitae* to Dr. Pervaiz Alam, Chair, Faculty Search Committee, Department of Accounting, 576 BSA, Kent State University, Kent, OH 44242; Phone: (330) 672-1121; Fax: (330) 672-2548; Email: palam@bsa3.kent.edu.

115 BETHEL COLLEGE, an evangelical Christian liberal arts college affiliated with the Missionary Church, is accepting applications for a full-time position in Accounting. Responsibilities include teaching traditional undergraduate courses such as Principles of Accounting, Intermediate Accounting, and depending on the qualification of the applicant, teaching various upper-level Accounting courses in the undergraduate and M.B.A. programs. Applicants should possess a Ph.D. or Master's degree in Accounting, or both an M.B.A. and CPA. Applicants must embrace the mission of Bethel College and be committed to excellence in teaching and the integration of faith and learning. Previous college teaching experience is preferred. Application Process: Send letter of application, *curriculum vitae,* three letters of reference, transcripts, and statement of philosophy of Christian liberal arts education to Dr. Rebecca Wilson, Dean of Instruction, Bethel College, Mishawaka, IN 46545; Email: wilsonr@bethelcollege.edu; Voice: (574) 257-3437. Women and minorities are especially encouraged to apply.

116 WASHINGTON UNIVERSITY IN ST. LOUIS, Olin School of Business, is seeking faculty in Accounting at mid and senior levels. The qualifications include a demonstrated interest in and capacity to do research publishable in leading Accounting journals and a high level of teaching competence in graduate and undergraduate classes. Candidates should hold a doctorate degree. Salary and faculty support are highly competitive. The Olin School has excellent physical, computing, and library facilities. Each application should include a *curriculum vitae* and include several samples of their scholarship. Send all materials to Dean Stuart I. Greenbaum, John M. Olin School of Business, Washington University, Campus Box 1133, One Brookings Drive, St. Louis, MO 63130-4899 Washington University is an Equal Opportunity/Affirmative Action Employer and welcomes applications from women and minorities.

117 THE UNIVERSITY OF TEXAS AT ARLINGTON, Department of Accounting, invites applications for tenure or tenure-track positions at the Assistant and Associate ranks in all areas of Accounting to begin September 2005. Applicants must have an appropriate doctoral degree at the time of joining the faculty. All applicants are expected to have a commitment to quality research demonstrated by publishing in nationally recognized "A" journals, teaching excellence, and academic/professional service. All areas of expertise will be considered. The College of Business and Department of Accounting are both AACSB-accredited. Review of applications will begin immediately, and continue until the position is filled. A complete resume and names of three references should be sent to The University of Texas at Arlington, Department of Accounting, Chandra Subramaniam, Search Committee Chair, Box 19468, Arlington, TX 76019. The University of Texas at Arlington is an Equal Opportunity and Affirmative Action Employer.

118 THE UNIVERSITY OF TEXAS AT DALLAS (UTD) invites applications for a faculty position in Accounting and Information Management effective September 2005. Appointment at Assistant, Associate, or Full Professor level will be considered. Appointees must have (or expect) a Ph.D. or equivalent and demonstrate the ability to conduct a nationally recognized research program. Graduate education in a university emphasizing research training, and ability and interest in interacting with faculty colleagues on research projects in related disciplines are desirable. Applicants should send a complete *curriculum vitae* (educational history; teaching, research, and work experience; list of publications, current research papers, and presentations), and names and addresses of three references to Academic Search #4113, The University of Texas at Dallas, PO Box 830688, M/S AD 23, Richardson, TX 75083-0688. Indication of sex and ethnicity for Affirmative Action statistical purposes is requested as part of the application, but not required. UTD is an AA/EO Employer and strongly encourages applications from candidates who would enhance the diversity of the University's faculty.

119 UNIVERSITY OF IDAHO, Department of Accounting, seeks applicants for tenure-track faculty appointment as Assistant or Associate Professor of Accounting beginning January or August 2005. Teaching emphasis will be in Managerial, Information Systems, and Financial Accounting. Salary depends on qualifications and experience. Ph.D. or D.B.A. in Accounting and demonstrated interest and/or record of teaching, research, and service accomplishments required. Professional certification is desired. ABDs will be considered. Applicants should apply online at http://www.hr.uidaho.edu (job seekers) or send applications including a complete resume, a graduate studies transcript, teaching evaluations, and letters from three professional references to Marla Kraut, Department of Accounting, University of Idaho, PO Box 443161, Moscow, ID 83844-3161; Phone: (208) 885-6453. Screening will begin immediately, but not sooner than September 30, 2004. AA/EOE.

120 MICHIGAN STATE UNIVERSITY, Eli Broad College of Business, Accounting & Information Systems, East Lansing, MI, invites applications for two tenured and/or nontenured faculty positions beginning August 2005. The primary need is in Financial Reporting; qualified applicants in other areas are welcome. Candidates must have a Ph.D. and the promise for the highest level of accomplishments in scholarly research and teaching. Significant research and teaching records are required for Associate/Full Professor positions. Rank/salary will be commensurate with qualifications. Send application letter, *curriculum vitae,* copies of representative working papers and publications, teaching evaluations (when applicable), and names or letters of references to Recruiting Coordinator, Accounting & Information Systems, Eli Broad College of Business, N270 Business College Complex, Michigan State University, East Lansing, MI 48824. Review of applications begins October 1, 2004 and continues until positions are filled. MSU is an Affirmative Action/Equal Opportunity Institution. Handicappers have the right to request and receive reasonable accommodation.

121 CENTRAL CONNECTICUT STATE UNIVERSITY invites applications for one tenure-track position in Accounting at the Assistant, Associate, or Full Professor level beginning Fall 2005. Applicants must have an earned doctorate in Accounting or be within one year of completion. Credentials and experience substantially similar to above may be considered. Experience and credentials above this level may be eligible for consideration at the level of Associate or Full Professor. Professional certification or experience is desirable. Teaching interest in Financial and/or Auditing is preferred. Applicants must have a commitment to excellence in teaching and scholarship. Review will continue until the position is filled. Send resume to Ms. Donna Stewart, Department of Accounting, School of Business, Central Connecticut State University, New Britain, CT 06050. CCSU is an Equal Opportunity Employer and specifically invites applications from women and minorities.

122 UNIVERSITY OF NEW HAMPSHIRE, Whittemore School of Business and Economics, invites applications for a tenure-track position in Accounting at the Assistant Professor level beginning Fall 2005. Applicants must have a doctoral degree or be near completion. Teaching interests in Financial and Managerial Accounting at both undergraduate and graduate levels are preferred. The successful candidate will be expected to maintain an active research and publication agenda in peer-reviewed journals. Interested applicants should submit a letter of interest, current *curriculum vitae,* three recommendation letters, recent teaching evaluations, and evidence of scholarly work to Professor Afshad Irani, Whittemore School of Business and Economics, Box A, McConnell Hall, University of New Hampshire, Durham, NH 03824; Telephone: (603) 862-3342. The school is accredited by the AACSB. Application review to begin immediately and continue until the position is filled. UNH is committed to excellence through diversity among its faculty and strongly encourages women and minorities to apply.

123 UNIVERSITY OF KENTUCKY, Gatton College of Business and Economics, seeks a Full Professor of high energy, enthusiasm, collegiality, and vision to serve as Director of the Von Allmen School of Accountancy (http://gatton.uky.edu/Academic/Accounting/Home/). The individual will provide leadership in building nationally recognized academic programs at undergraduate and graduate levels and will guide a major increase in the School's research output. The successful candidate will have a strong research record and academic reputation. Prior administrative experience is highly desirable. Compensation is competitive and commensurate with qualifications. The search will continue until the position is filled. Interested candidates should submit *curriculum vitae,* cover letter detailing interest in the position, and contact information for references to Professor Clyde Holsapple, Accountancy Search Committee Chair, 425B Gatton Building, University of Kentucky, Lexington, KY 40506-0034; Email: cwhols@uky.edu; Phone: Donna Ballos (859) 257-3592. The University of Kentucky is an Equal Opportunity/Affirmative Action Employer.

124 SHIPPENSBURG UNIVERSITY invites applications for full-time tenure-track Accounting position(s) beginning August 2005. Complete position announcement can be viewed at: http://www.ship.edu/HR/Index.html. Submit applications to Dr. Scott N. Cairns, Department of Accounting and Management Information Systems, 1871 Old Main Drive, Shippensburg, PA 17257-2299.

125 UNIVERSITY OF CENTRAL FLORIDA is seeking applicants for Assistant or Associate Professor position starting in August 2005. Earned doctorate or expected completion of degree requirements by August 2005 is necessary. Candidates for Assistant Professor must demonstrate excellent teaching and research potential with an academic background strongly suggesting the ability to establish an ongoing program of basic research directed toward publication in top-quality accounting journals. Candidates for Associate Professor must exhibit a record of excellent teaching and research with evidence of an ongoing program of basic research including publications in top-quality accounting journals. Professional certification and experience are desirable. Specific research concentration(s) of the selected candidate will be secondary to that individual's overall record of scholarly accomplishments. Applicants should submit a letter of interest and a *curriculum vitae,* along with the names of three references to Dr. Andrew Judd, Director, School of Accounting, College of Business Administration, University of Central Florida, PO Box 161400, Orlando, FL 32816-1400; Phone: (407) 823-2871; Email: AndrewJudd@bus.ucf.edu. For additional information, please visit: http://www.bus.ucf.edu/accounting/.

126 UNIVERSITY OF CENTRAL FLORIDA, College of Business Administration, invites applications and nominations for the Ernst & Young Professorship in the School of Accounting. The appointment will be at the rank of Associate Professor or Professor. Candidates must have an earned doctorate and an outstanding record of teaching, research, and service in Accounting. Current initiatives in the School focus on increasing contributions in high-quality scholarship and delivery of doctoral education. Specific research concentration(s) of the selected candidate will be secondary to that individual's overall record of scholarly accomplishments. Successful applicants may negotiate starting date (August 2005 is desirable) and other terms. Applicants for this position should submit a letter of interest and a *curriculum vitae,* along with the names of three references to Dr. Andrew Judd, Director, School of Accounting, College of Business Administration, University of Central Florida, PO Box 161400, Orlando, FL 32816-1400; Phone: (407) 823-2871; Email: AndrewJudd@bus.ucf.edu. For additional information, please visit: http://www.bus.ucf.edu/accounting/.

127 BUTLER UNIVERSITY invites applications for a tenure-track position in Accounting at the Assistant or Associate level beginning August 2005. Applicants from all areas of Accounting are encouraged to apply. Assistant Professor candidates should have or be near completion of a doctorate; Associate Professor candidates should have an earned doctorate. Applicants should be capable of high-quality teaching at both the undergraduate and graduate levels, willing to embrace integrated, experiential learning, and be actively involved in conducting and publishing research. Butler's College of Business Administration is AACSB-accredited, and enrolls approximately 700 full-time undergraduate and 300 graduate students in its M.B.A. and recently approved M.P.Acc. programs. Butler is a selective, comprehensive, private university set on a wooded 300-acre campus in a residential area just north of downtown Indianapolis. Its proximity to downtown Indianapolis provides many opportunities for professional interaction, and a variety of cultural, athletic, and social activities. Candidates are encouraged to submit a letter of interest and *curriculum vitae* to Dr. Karel Updyke, College of Business Administration, Butler University, 4600 Sunset Avenue, Indianapolis, IN 46208; Email: kaupdyke@butler.edu; Phone: (317) 940-9531.

128 COLUMBIA UNIVERSITY BUSINESS SCHOOL seeks applications for faculty positions in Accounting. Rank is open. Candidate with an interest in Financial Accounting research will be preferred. Qualified applicants will possess a doctoral degree (or be close to completion) and evidence a strong commitment to both teaching and research. We offer a highly supportive research environment and easy interaction with faculty in other disciplines. Salary and benefits are competitive. Please send resume, a research paper, and letter(s) of recommendation to Professor Nahum Melumad, Columbia University Business School, 610 Uris Hall, 3022 Broadway, New York, NY 10027. An Equal Opportunity, Affirmative Action Employer, women and minorities are especially encouraged to apply.

129 UNIVERSITY OF CONNECTICUT, Accounting Department, invites applicants for two tenure-track openings at the rank of Instructor, Assistant, or Associate Professor beginning Fall 2005. Qualified applicants at the Associate rank must possess a reputation for scholarship, teaching success in business school programs (undergraduate, M.S. in Accounting, M.B.A., Ph.D., and Executive Education) and service. Qualified applicants at the Assistant Professor rank must have an earned doctorate by August 23, 2005, have good research skills and a strong commitment to teaching and research. Applicants must have teaching interest in Advanced or Managerial Accounting. However, candidates who can teach in multiple areas are preferred. Review of applications will continue until the position is filled. Please submit nominations/applications to Dr. Mohamed Hussein, School of Business, 2100 Hillside Road, Unit 1041A, Storrs, CT 06269-1041; Email: mhussein@business.uconn.edu. The University of Connecticut is an Equal Opportunity/Affirmative Action Employer. We encourage applications from under-represented groups, including minorities, women, and people with disabilities. Search #05A142.

130 UNIVERSITY OF NEVADA, LAS VEGAS, College of Business, an AACSB-accredited college at both undergraduate and graduate levels, invites applications for a Full Professor position as the Kenneth and Tracy Knauss Endowed Chair in Accounting to start Fall 2005. The position requires a primary interest in Auditing and/or Accounting Information Systems and involves teaching at the undergraduate and graduate levels, conducting significant research leading to high-quality refereed publications, and performing service activities. Candidates should have an excellent teaching record, outstanding research with recent, high-quality publications, and the willingness to act as a research mentor to untenured faculty members. A doctoral degree from an accredited college or university in the appropriate area is required. Applicants must have qualifications sufficient to be awarded tenure. Salary is competitive; contingent on market. This position is contingent upon funding. Application details may be obtained by visiting: http://hr.unlv.edu/Employment_Svcs. UNLV is an Equal Opportunity/Affirmative Action Employer committed to excellence through diversity.

131 NORTH CAROLINA STATE UNIVERSITY is seeking applicants for tenure-track faculty positions starting Fall 2005. Applicants must have a Ph.D. in Accounting or anticipate completion of a Ph.D. in Accounting or Information Systems by Fall 2005. Preference will be given to those applicants with interests in enterprise risk management (ERM) and teaching interests in the areas of ERM, Financial Accounting, or Accounting Information Systems. Please send letters of application, *curriculum vitae,* and names/addresses of three references to Recruiting Coordinator, Box 8113, North Carolina State University, Department of Accounting, Raleigh, NC 27695-8113. North Carolina State University is an Affirmative Action and Equal Opportunity Employer. ADA Accommodations: Ginger Howell, Department of Accounting; Phone: (919) 515-2256.

132 UNIVERSITY OF HOUSTON, C.T. Bauer College of Business, Department of Accountancy, invites applications for two tenure-track appointments at all ranks for Fall 2005. Applicants for senior positions should have a national reputation for scholarship, and a record of excellence in teaching at the undergraduate and graduate levels. Applicants for junior positions should have (or be near completion of) a doctoral degree and exhibit strong potential for and commitment to excellence in research and teaching. We are seeking applications in all areas of Accounting. The C.T. Bauer College of Business and the department are AACSB-accredited. Salaries are very competitive. Please send a copy of your resume, research papers, and relevant teaching materials to The Recruiting Committee, c/o Dr. K. Sivaramakrishnan, University of Houston, C.T. Bauer College of Business, 334 Melcher Hall, Houston, Texas 77204-6021; Email: ksivaram @mail.uh.edu. The University of Houston is an Equal Opportunity/Affirmative Action Employer. Women, minorities, veterans, and individuals with disabilities are encouraged to apply.

133 GEORGE MASON UNIVERSITY, School of Management, invites applications and nominations for Accounting faculty tenure-line positions at all ranks. Special consideration will be given to candidates with teaching and research interests in Managerial Accounting, Accounting Information Systems, Corporate Governance, and International Accounting. Successful candidates will have a Ph.D. and a strong commitment to excellence in teaching and scholarly research. Located in Fairfax, Virginia just outside Washington D.C., the School of Management and Accounting Program are accredited by AACSB-International. The School of Management offers undergraduate degrees in Business, including Accounting, and the M.B.A., E.M.B.A., Technology Management, and Bioscience Management degrees at the graduate level. Apply online to this link: http://jobs.gmu.edu/applicants/jsp/shared/frameset/Frameset.jsp?time=1097855170444 to submit your letter of interest and *curriculum vitae*. Also, please email your letter of interest and *curriculum vitae* to Dr. Gopal Krishnan at gkrishn1@gmu.edu. George Mason University is an Equal Opportunity/Affirmative Action Employer.

134 CALIFORNIA STATE UNIVERSITY, STANISLAUS, Department of Accounting and Finance, invites applications for a full-time, tenure-track position at the rank of Assistant Professor for Fall 2005. Desired area of specialization is Taxation. Candidates must possess a Ph.D. in Accounting from an AACSB-accredited university by December 2005. Professional certification is desirable. Compensation will be competitive, commensurate with qualifications and experience. This position is contingent upon available funding. To apply, please submit a letter of application, updated and complete *curriculum vitae,* three letters of reference, an original transcript from the doctoral-degree-granting institution, copies of research and publications, and evidence of teaching effectiveness to Dr. Annhenrie Campbell, Chair, Accounting Search Committee, Department of Accounting and Finance, California State University, Stanislaus, 801 W. Monte Vista Avenue, Turlock, CA 95382; Email: acampbel@athena.csustan. CSU, Stanislaus is an Equal Opportunity/Affirmative Action Employer.

135 UNIVERSITY OF ILLINOIS AT CHICAGO invites applications for tenure-track positions at Assistant or Associate Professor levels from candidates interested in all areas of Accounting, especially Auditing, beginning August 2005. Applicants should possess a Ph.D. and exhibit capacity to produce quality research and commitment to teaching excellence. Visit http://accounting.cba.uic.edu/ for further information. UIC is one of seventy Research I universities in the country. The Department of Accounting is AACSB-accredited with 500 undergraduate and 100 graduate students and the College of Business Administration has 2,500 undergraduate and 1,000 graduate students. Please submit *curriculum vitae*, representative publications, and three letters of references to Ram T. S. Ramakrishnan, CBA Accounting Dept, MC 006, 601 S. Morgan St., Chicago, IL 60607 or send by email to rramakri@uic.edu by February 25, 2005. UIC is an AA/EOE.

136 McNEIL TECHNOLOGIES, located in Springfield, Virginia, is looking for a Billing Manager to support and supervise the monthly billing process for a rapidly expanding government contractor. The ideal candidate will have significant experience utilizing Deltek software, as well as at least 2 years of supervisory skills plus excellent reconciliation skills. Good spreadsheet and verbal/written communications skills are also required; degree is a must. Fax resume and salary requirements to (703) 921-1610, or send email to cwatson@mcneiltech.com. Attention: CW. EOE-AA.

137 THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL, Kenan-Flagler Business School, is seeking to hire a faculty member for a position in the Accounting Area, rank open. Applicants should be able to teach in at least one of the following areas: Financial Accounting, Managerial Accounting, Taxation, or Auditing. This position requires a Ph.D. with emphasis in Accounting and a demonstrated commitment to research. Applicants should have teaching experience as well as significant research accomplishments. All applicants should be able to contribute to the University's teaching mission at the undergraduate, Master's of Accounting, M.B.A., Ph.D., and executive education levels. Interested individuals should write, enclosing *curriculum vitae,* a sample of research papers, and four letters of recommendation to Prof. Edward Maydew, Chair of Accounting Area, Kenan-Flagler Business School, The University of North Carolina at Chapel Hill, McColl Bldg CB 3490, Chapel Hill, NC 27599-3490. The University of North Carolina at Chapel Hill is an Equal Opportunity Employer.

138 SAN FRANCISCO STATE UNIVERSITY has two tenure-track faculty openings, one in Financial Accounting and one in Managerial Accounting. Candidates must have a Ph.D. or D.B.A. at time of employment, and have a strong commitment to both research and teaching. Professional experience or certification is desirable. The position will be filled at the rank of Assistant Professor. The Department of Accounting offers concentrations in Accounting for B.S., M.B.A., and M.S.B.A. degrees. The College of Business is AACSB-accredited at both the undergraduate and graduate levels. Accounting is one of eight departments in the College of Business with approximately 20 faculty and 1,000 accounting majors. Send *curriculum vitae,* with names and telephone numbers of three references to George Frankel, Chair, HRPT Committee, Department of Accounting, College of Business, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132. Closing date for applications is February 13, 2005. SFSU is an Affirmative Action/Equal Opportunity Employer.

139 OREGON STATE UNIVERSITY invites applicants for a tenure-track Assistant Professor position in Accounting and Management Information Systems effective September 2005. Responsibilities include research, quality teaching, and professional activities in the field of Accounting and Management Information Systems. Primary teaching responsibilities are undergraduate courses in Accounting Information Systems and Management Information Systems; secondary responsibilities may include an undergraduate course in Business Information Systems Design and Development. Candidates should hold the appropriate doctorate. Salary is competitive; fringe benefits are excellent. Oregon State University is located in Corvallis, rated the second-best small city in America. Interested applicants should submit a letter of interest, current *curriculum vitae,* recent teaching evaluations, evidence of scholarly work, and a list of three references to Dr. Roger Graham, College of Business, 200 Bexell Hall, Oregon State University, Corvallis, Oregon 97331-2603. For full consideration apply by February 15, 2005. See full position announcement at: http://oregonstate.edu/jobs. OSU is an AA/EOE.

140 MILLSAPS COLLEGE, Else School of Management, invites applications for a one-year appointment, beginning Fall 2005. Candidates who are ABD or who have an appropriate Master's degree with professional certification will be considered. Applicants should demonstrate expertise and teaching experience. The College seeks faculty who are committed to excellence in instruction and research, and who appreciate the student-centered, participative learning environment of the Else School of Management. Located in Jackson, the commercial, governmental, and cultural center of Mississippi, Millsaps is a highly selective, 1,400-student, liberal arts college with a chapter of Phi Beta Kappa and AACSB accreditation. The Else School of Management offers B.B.A., M.B.A., and M.Acc. degrees. Salary is competitive. Review of applications will begin immediately and will continue until an appointment is made. To be considered, please send letter of interest and *curriculum vitae* to Dr. W. Ken Harmon, Dean, Else School of Management, Millsaps College, 1701 N. State Street, Jackson, MS 39210. Millsaps College is an Equal Opportunity Employer and encourages applications from women and minorities.

141 EASTERN CONNECTICUT STATE UNIVERSITY, Business Administration Department, invites applications for tenure-track faculty positions in Accounting (one Assistant Professor and one Associate/Full Professor) and Finance (one Assistant Professor). Ph.D. is required; ABD near completion considered. The successful Accounting candidates will have a concentration in Accounting, Taxation, or other accounting-related fields. Accounting candidates will also have professional certificate(s) and be technologically competent. Teaching assignment will include all levels of undergraduate/graduate Accounting. The successful Finance candidate will have a concentration in Finance. Teaching assignment will include Finance courses with emphasis on Financial Management and Institutions, Personal Financial Planning, Small Business Finance, and other Finance electives in both the undergraduate Business Administration program and the graduate Organizational Management program. The Finance candidate must have an interest in team teaching and the ability to identify and discuss the functional areas of business management. Application procedures/full advertisement for each position are located at http://www.easternct.edu.

142 CALIFORNIA STATE UNIVERSITY, SACRAMENTO (CSUS), Department of Accountancy, invites applications from individuals interested in joining our dynamic and growing faculty for a tenure-track, Assistant Professor in the area of Financial Accounting. A doctoral degree in Accountancy from a AACSB-accredited school is required. ABDs will be considered. Primary emphasis is on teaching, but research and service are also required. Record of, or potential for, effective teaching and ability to work with diverse groups is required. Preferences will be given to applicants having a demonstrated record of research. Summer research grants, moving expenses, and a reduced teaching load may be available. Applicants should send a letter stating their interests and qualifications along with transcripts of highest degree earned and a *curriculum vitae* to Suzanne Ogilby, Chair, Department of Accountancy, CSUS, Sacramento, CA 95819-6088. First review of the applications will begin August 8, 2004, and will continue until the position is filled. CSUS is an AA/EEO Employer that hires only individuals who are lawfully authorized to accept employment in the United States.

143 UNIVERSITY OF MARYLAND seeks applicants for a continuing non-tenure-track teaching position in Accounting. The position is for nine months beginning August 2005, and is renewable subject to performance. Off-term teaching is available. Candidates must possess a doctorate and an excellent teaching record, especially at the Master's level. Teaching breadth will be valued. Certain student support and service responsibilities will be expected. Send a *curriculum vitae,* three letters of recommendation, and evidence of teaching effectiveness to Professor Oliver Kim, The Robert H. Smith School of Business, University of Maryland, College Park, MD 20742-1815. The University of Maryland is an Equal Opportunity/Affirmative Action Employer. Women and minorities are especially encouraged to apply.

144 UNIVERSITY OF SASKATCHEWAN, Saskatoon, Canada, is seeking applicants for tenure-track positions in Accounting at the Assistant, Associate, and Full Professor ranks starting July 1, 2005. Candidates who hold or are nearing completion of a Ph.D. in Accounting are encouraged to apply. Specializations desired are Financial Accounting, Managerial Accounting, Auditing, and Tax. Submit all applications to Dr. Suresh S. Kalagnanam, Head, Department of Accounting, College of Commerce, 25 Campus Drive, Saskatoon, Saskatchewan, Canada, S7N 5A7, Phone: (306) 966-8404; Email: Kalagnanam@commerce.usask.ca. The University is committed to employment equity. Members of designated groups (women, aboriginal people, people with disabilities, and visible minorities) are encouraged to self-identify on their applications. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

145 CALIFORNIA STATE UNIVERSITY, BAKERSFIELD, seeks candidates for a tenure-track position in Accounting. Rank depends upon experience. Applicants should possess an earned doctorate from an AACSB-accredited institution or anticipate completion by August 31, 2006. For a full description of the position, please visit: http://www.csub.edu/academicaffairs/facemp/BPA-department.htx. Interested candidates should submit a letter of application, complete *curriculum vitae,* and three letters of reference to Dr. Janis Ruiz, Department of Finance and Accounting, School of Business and Public Administration/BDC 20, California State University, Bakersfield, 9001 Stockdale Highway, Bakersfield, CA 93311-1099. Review of applications will begin January 10. The search will remain open until the position is filled. California State University, Bakersfield, fosters and appreciates ethnic and cultural diversity among its faculty and students and is committed to increasing diversity of its faculty to reflect the diversity of the campus committee. Applications from women, ethnic minorities, veterans, and individuals with disabilities are welcome.

146 MIDDLE TENNESSEE STATE UNIVERSITY, Department of Accounting, invites applications for one tenure-track faculty position (number 110080) at the Assistant/Associate Professor rank, beginning August 2005. Candidates should possess an earned doctorate (ABD will be considered if applicant is close to completion) in Accounting. Women and minorities are encouraged to apply. MTSU is located in Murfreesboro, 30 miles southeast of Nashville. The Department of Accounting offers an undergraduate degree in Accounting, an M.S. degree in Accounting/Information Systems, and supports the Accounting concentration in the M.B.A. program. The Department earned separate AACSB accreditation in 2004. Initial screening interviews will be conducted at the AAA Annual Meeting. Review of formal applications will begin December 1, and will continue until filled. Submit application letter, resume, transcripts, and three letters of reference to Dr. G. Robert Smith, Jr., Search Committee Chair, MTSU Box 50, Murfreesboro, TN 37132.

147 INDIANA UNIVERSITY, Department of Accounting, invites applications for a Clinical Associate Professor position effective Fall 2005. Clinical faculty members hold full-time faculty positions. They focus their effort on teaching, direct supervision of student activities, mentoring, and other forms of instruction. They bring work experience, contacts, and other talents into the classroom as an important part of the instructional mission of the University. The teaching load is nine credit hours per semester. After a probationary period, clinical faculty will have a renewable long-term contract. Interested candidates should send a current *curriculum vitae* and a letter of interest to the contact person below. Applications received before January 15, 2005 will be given full consideration. Contact address: Joe Fisher, Chair, Department of Accounting, Kelley School of Business, Indiana University, 1309 E. 10th Street, Bloomington, IN 47405-1701; Phone: (812) 855-3705; Email: jofisher@indiana.edu. Indiana University is an Equal Opportunity/Affirmative Action Employer.

148 THE UNIVERSITY OF TENNESSEE, KNOXVILLE, is accepting applications for a 12-month, tenure-track position (Assistant or Associate Professor) to begin August 1, 2005, or earlier if possible. The position is a joint appointment between the Department of Accounting and Information Management (http://www.bus.utk.edu/acct) and the Center for Business and Economic Research. Teaching load is two courses per year with the remainder of effort spent on CBER and other academic research. CBER duties will focus on state and local taxation and require abilities and skills that are complementary with economics. Candidates should hold a doctoral degree in Accounting with a specialization in Taxation, or expect to complete all degree requirements by his or her starting date. Position is subject to final budgetary approval. Applications from minorities and women are strongly encouraged. Review of applications will continue until positions are filled. Send applications to Dr. Keith G. Stanga, Search Committee Chair, Department of Accounting and Information Management, CBA, The University of Tennessee, Knoxville, Tennessee 37996-0560; Email: kstanga@utk.edu. UT Knoxville is an EEO/AA/Title VI/Title IX/Section 504/ADA/ADEA Institution in the provision of its education and employment programs and services.

149 ELIZABETHTOWN COLLEGE, Department of Business, invites applications for a tenure-track position for the Bitting Chair in Accounting at the Assistant, Associate, or Professor rank beginning in Fall 2005. Ph.D. in Accounting is strongly preferred. J.D.s with LL.M or CPA will also be considered. Candidates must have a commitment to teaching excellence and professional development. Bitting Chair responsibilities include program development, student recruitment, external relations, and internships. (For more details, please visit http://www2.etown.edu/HumanResources/faculty/Edgar%20T%20Bitting.asp.) Elizabethtown College, consistently rated as one of the top northern comprehensive colleges, is located in Pennsylvania's historic Lancaster County with easy access to Philadelphia, Washington, and Baltimore. Send *curriculum vitae,* teaching evaluations, and list of three references to Human Resources, Elizabethtown College, One Alpha Drive, Elizabethtown, PA 17022.

150 UTICA COLLEGE invites applications for a tenure-track position in Accounting at the Assistant/Associate Professor level for Fall 2005. Applicants should have a primary or secondary interest in teaching Managerial Accounting at both the undergraduate and M.B.A. levels. Candidates should hold an earned doctorate from an AACSB-accredited institution or be in the final stage of completion. CMA or CPA certification and professional experience in Managerial Accounting or Consulting is also desirable. Utica College is a comprehensive college offering graduate and undergraduate programs in both resident and distance formats. Send *curriculum vitae* and three letters of recommendation to Dr. Stephen P. Neun, Dean of Social Sciences and Management, Utica College, 1600 Burrstone Rd, Drawer # 333, Utica, NY 13502. Screening of applications will begin December 1, 2004 and will continue until a candidate is selected. AA/EOE.

151 NORTHEASTERN UNIVERSITY anticipates an opening for a tenure-track position effective September 2005 at the Assistant Professor rank. *Requirements:* Candidates must possess the doctoral degree and have strong commitment to excellence in teaching and scholarly research. *Salary:* competitive and negotiable. *The Accounting Department:* There are currently twelve tenure-track members of the Accounting Group: four full Professors, eight Associate Professors, one Assistant Professor, all of whom hold doctoral degrees. Four faculty have distinguished professorships. *Research Opportunities:* Support is available in terms of summer funding, release time from teaching, graduate assistants, and travel for academic conference presentations. *The Teaching Position:* Undergraduate and graduate levels (M.B.A., M.S./M.B.A., M.S.A., and M.S. Tax programs). *Contact Person:* Dr. Paul A. Janell, Accounting Group, 404 Hayden Hall, Northeastern University, Boston, MA 02115, (617) 373-4645; Email: p.janell@neu.edu. Northeastern University is an Affirmative Action/Equal Opportunity/Title IX Employer. Minorities, women, and persons with disabilities are strongly encouraged to apply.

152 CALIFORNIA STATE UNIVERSITY, HAYWARD, is seeking a tenure-track faculty position at the Assistant Professor level in Financial Accounting or Management/Cost Accounting. Candidates with additional qualifications in Auditing or Taxation are desirable. Candidate must have an earned doctorate in Accounting no later than the date of appointment: September 2005. For additional information and conditions, please consult: http://www.csuhayward.edu/OAA/ttposann.html#ACCT. Review of applications will begin on January 5, 2005 and will continue until the position is filled. Please submit a letter of application, a complete and current *curriculum vitae*, graduate transcripts, student evaluations, copies of major publications, and three letters of recommendation to Professor Gary R. McBride, Chair, Department of Accounting and CIS, California State University, Hayward, 25800 Carlos Bee Blvd, Hayward, CA 94542; Tel: (510) 885-3397, Fax: (510) 885-4884. CSUH is an Equal Opportunity Employer.

153 CALIFORNIA STATE UNIVERSITY, HAYWARD, is seeking a tenure-track faculty position at the Assistant Professor level in the area of Financial Accounting. Candidates qualified to teach Finance are also desirable. Candidate must have an earned doctorate in Accounting no later than the date of appointment: September 2005. For additional information and conditions, please consult: http://www.csuhayward.edu/OAA/ttposann.html#ACCT. Review of applications will begin on January 5, 2005 and will continue until the position is filled. Please submit a letter of application, a complete and current *curriculum vitae*, graduate transcripts, student evaluations, copies of major publications, and three letters of recommendation to Professor Gary R. McBride, Chair, Department of Accounting and CIS, California State University, Hayward, 25800 Carlos Bee Blvd, Hayward, CA 94542; Tel: (510) 885-3397; Fax: (510) 885-4884. CSUH is an Equal Opportunity Employer.

154 RHODES COLLEGE seeks applications for a Fall 2005 Accounting position, rank open, from individuals with an appreciation of the opportunities associated with working in a liberal arts setting with a highly selective student body. The successful candidate should possess a Ph.D., preferably a CPA certificate, and credentials appropriate for a department that values both teaching excellence and research production. Interests may be in several areas, but Financial and Managerial are preferred. Submit *curriculum vitae*, three letters of recommendation, evidence of teaching excellence, graduate transcript, and writing sample of research to Dr. Pamela Church, Economics and Business, Rhodes College, 2000 North Parkway, Memphis, TN 38112. Review of applications will begin immediately and continue until position is filled. Founded in 1848, Rhodes College is a highly selective, private, coeducational, residential college. Rhodes offers an excellent benefits package and great working environment. For additional information, please visit: http://www.rhodes.edu/Rhodes-College-Commitment-to-Diversity.cfm. We are an Equal Opportunity Employer committed to diversity in the workforce. Rhodes College has been related to Presbyterian Church USA since 1855.

155 INTERNATIONAL UNIVERSITY OF JAPAN, Graduate School of International Management (M.B.A. Program), invites applications for a faculty position in Financial Accounting. All instruction is in the English language. The rank is open, though qualified candidates must hold a Ph.D. and demonstrate strong research and teaching capabilities. IUJ offers competitive contract-based compensation, research funding, and a light three-course-per-academic-year teaching load (core plus two electives). The expected start date is April 1, 2005. Qualified candidates should send a letter of application conveying interest in this position and in working in Japan, a *curriculum vitae*, three references, a brief forward-looking research plan, and recent research papers by email attachment to hiura@iuj.ac.jp or by mail to Ms. Chikako Hiura, Accounting Faculty Search Committee, Graduate School of International Management, International University of Japan, Yamato-machi, Minami-Uonuma-gun, Niigata 949-7277, JAPAN; Phone: +81-25-779-1489; Fax: +81-25-779-1460. For additional information, please visit: http://www.iuj.ac.jp.

156 GEORGIA STATE UNIVERSITY invites applications for two positions in the School of Accountancy effective Fall 2005. For the tenure-track position, new Ph.D.s to new associates are encouraged to apply. The candidate's focus should be on Financial Accounting teaching and Financial Archival-Empirical Research publishable in top accounting journals. A second, non-tenure track position, will be filled at the Lecturer or Clinical Assistant Professor level. Candidates must have a master's or doctorate in Accounting and must possess demonstrated capability in high-level classroom performance. A Clinical Assistant Professor must have a Ph.D. and significant recent practical experience. Salaries are competitive. Send letter of application and *curriculum vitae* to Jane Mutchler, Director, School of Accountancy, Robinson College of Business, Georgia State University, PO Box 4050, Atlanta, GA 30302-4050. Send electronic submissions to jmutchler@gsu.edu. Preference is given to applications received by February 1, 2005. Georgia State University is an Equal Opportunity Educational Institution/Affirmative Action Employer.

TAYLOR & FRANCIS

European Accounting Review

The Research Journal of the European Accounting Association
www.eaa-online.org
Volume 14, 2005, 4 issues per year
Print ISSN 0963-8180
Online ISSN 1468-4497

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UIC University of Illinois at Chicago

The University of Illinois at Chicago invites applications for tenure track positions at the Assistant or Associate Professor levels from candidates interested in all areas of accounting, particularly auditing, beginning August 2005. Applicants should possess a Ph.D. and exhibit capacity to produce quality research and commitment to teaching excellence at all levels. Visit our website for further information http://accounting.cba.uic.edu/. UIC is a Carnegie Doctoral Research extensive University. The Department of Accounting is AACSB accredited with 500 undergraduate and 100 graduate students and is part of the College of Business Administration with 2500 undergraduate and 1000 graduate students. For fullest consideration, applications should be received by February 28, 2005, but will be accepted until the position is filled. Please submit curriculum vitae, representative publications, and three letters of reference to Ram T.S. Ramakrishnan, UIC-CBA Accounting Dept, M/C 006, 601 S. Morgan St., Chicago, IL 60607 or e-mail rramakri@uic.edu. UIC is an AA/EOE.

THE CHINESE UNIVERSITY OF HONG KONG

School of Accountancy

The School of Accountancy is a pioneer and leader in accounting education in Hong Kong and Asia since 1963. The School has established an excellent reputation for professional education and research. It offers BBA, MAcc, EMPAcc, MPhil and PhD degree programmes in accountancy. Its premier business and accounting programmes are keenly sought after in Hong Kong. To further enhance its role as an international center for excellent accounting education and research, established and promising accounting scholars in all fields of accounting around the world are invited to join its strong and devoted faculty team.

Applications are now invited for:

Assistant Professors/Associate Professors/Professors or Visiting Scholars
(Ref. 04/146(020)/2)

Applicants should have a PhD degree (those in the final stage of writing their dissertation may also apply). Appointees will be required to teach courses (financial accounting, management accounting, auditing, taxation, and accounting information system) at both undergraduate and postgraduate levels, and for day-time as well as evening programmes. Commitment to teaching excellence, quality scholarly research and School/University service is required. Appointments will be made on a fixed-term contract basis for one to three years. Visiting appointments of shorter duration may also be arranged. Details of the School can be found at *http://www.baf.cuhk.edu.hk/acy*.

Salary and Fringe Benefits: Salary will be highly competitive, commensurate with qualifications and experience. The University offers a competitive fringe benefit package including a contract-end gratuity for appointments of two years or longer, and housing for eligible appointees. Further information about the University and the general terms of service for teaching appointees is available at *http://www.cuhk.edu.hk/personnel*. The terms mentioned herein are for reference only and are subject to revision by the University.

Application Procedure: Please send full resume, copies of academic credentials, a publication list and/or abstracts of selected published papers, together with names, addresses and fax numbers/e-mail addresses of three referees to whom applicants' consent has been given for their providing references (unless otherwise specified), to Professor James Xie, Director of School of Accountancy, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong or email to *xie@baf.msmail.cuhk.edu.hk*. Applications will be accepted until the positions are filled. The Personal Information Collection Statement will be provided upon request. Please quote the reference number and mark 'Application - Confidential' on cover.

THE AMERICAN UNIVERSITY IN CAIRO

Founded in 1919, AUC's campus is located in Cairo, Egypt, and its degree programs are accredited by the Commission on Higher Education of the Middle States Association of Colleges and Schools. For more information see our website at www.aucegypt.edu. One- two- or three-year appointments subject to mutual agreement will begin September 2005. Renewal of an appointment depends upon institutional needs and/or the appointee's performance. The normal teaching load is three courses per semester and English is the language of instruction. Salary and rank are according to scale based on qualifications and professional experience. For expatriates, benefits include housing, annual round-trip air travel for appointee and qualifying dependents, plus schooling for the equivalent of up to two children at Cairo American College. In view of AUC's protocol agreement with the Egyptian Government, which requires specific proportions of Egyptian, U.S., and third-country citizen faculty, at this time preference will be given to qualified applicants who are U.S. citizens.

Department of Management

Finance (revised announcement). The successful applicant will have expertise in one or more of several possible subfields, including investments, corporate finance, financial markets, insurance, banking, real estate and financial management. The applicant should be actively engaged in research and have a solid understanding of the practical issues faced by managers. Salary and research support are competitive. Ph.D. from an accredited institution required.

APPLICATION INSTRUCTIONS: E-mail a letter of interest specifying position **# MGMT-2** with C.V. and names and addresses of three references to **facultyaffairs@aucnyo.edu** or mail to:

Dr. Earl (Tim) Sullivan, Provost
The American University in Cairo
420 Fifth Avenue, Fl. 3
New York, N.Y. 10018-2729

and complete the Personnel Information Form provided at **http://forms.aucegypt.edu/provost/pif3.html**.
Review of candidates to begin immediately; applications accepted until position is filled.

The American University in Cairo is an equal opportunity employer.

Lingnan 嶺南大學 University

Lingnan University is the only liberal arts institution in the Hong Kong Special Administrative Region. It offers honours bachelor's degree and postgraduate programmes up to the doctoral level. Applications are invited for the following posts in the Department of Accountancy, which will be tenable from mid-August 2005:

Professor/Associate Professor/Assistant Professor **(Post Ref.: 04/83/AR)**

The appointee should be able to teach in at least three of the following areas: Financial Accounting, Managerial Accounting, Auditing, Accounting in China and Legal Aspects of Business. Successful appointees are expected to have a strong commitment to teaching excellence, quality research and services to the Department and the University community. The rank and remuneration on appointment will be commensurate with relevant experience and research track records.

Salary:

Professor	Around US$104,100 – US$135,400 per annum
Associate Professor	Around US$85,000 – US$111,900 per annum
Assistant Professor	Around US$62,400 – US$98,500 per annum

Recruitment will continue until the position is filled. Applicants are invited to send in their dossier, together with a personal data sheet (Form R1) which is obtainable from the University's homepage at *http://www.ln.edu.hk/main/jobs/form.htm*, to the **Human Resources Office, Lingnan University, Tuen Mun, Hong Kong** by post, by fax (852) 2891-5782, or by email: recruit@LN.edu.hk. The University reserves the right not to fill the post or to fill the post by invitation or by search. Further information on Lingnan University can be found on the University's website: *http://www.LN.edu.hk*

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China Stock Market, Bond Market, Banking and Economic Databases for Research

China GTA Company, a data Vendor (CSMAR database) of Wharton Research Data Service (WRDS) **(pleas visit WRDS website for the details http://wrds.wharton.upenn.edu/),** has been specialized at developing Chin stock market, bond market, banking and economic databases for international academic and industry researchers. Al GTA's databases are designed to be compatible with international database standards and have been verified by mor than 100 professors and experts.

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CSMAR major research databases (GTA provides also contracted/customized research service)

China Macroeconomic

- China Macroeconomic Database

China Stock Market

- CSMAR China Stock Market Trading Database
- China Stock Trade and Quote Research Database
- CSMAR China Stock Market Financial Database—Annual/ Interim/ Quarterly Report
- China Listed Companies' Financial Ratio Research Database
- China Initial Public Offering Research Database
- China Listed Corporate Governance Research Database
- China Listed Companies' Merger & Acquisition, Asset Restructuring Research Database
- China Stock Market Information Disclosure System
- China Stock Market Related Party Transaction Research Database*
- China Regulatory Enforcement Research Database

China Fund Market

- China Securities Investment Fund Research Database
- China Close-end Fund Trade and Quote Research Database

China Bond Market

- China Listed Bond Research Database
- China Listed Convertible Bond Research Database
- China Bond Trade and Quote Research Database

China Futures Market

- China Futures Research Database

Hong Kong Securities Market

- Hong Kong GEM Stock Market Trading Database
- Hong Kong GEM IPO Research Database

Selected Products for securities analysis purposes:

- Daily updating system of China Stock Market & Accounting Research Database (CSMAR): Including financial and trading data updated on a daily basis.
- China ValueLine (CVL) system
- China Securities Information and Analysis System (CSIAS)
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ns to James Myers, Linda Myers and Thomas Omer. Their study,
term of the auditor-client relationship and the quality of earnings: a case
auditor rotation," has been chosen by the Financial Executive Research
. as *The Accounting Review* article of the year 2003. This award is part of
y the Stan Ross Department of Accountancy at Baruch College in
ith the American Accounting Association and the Financial Executive
ndation, Inc. (FERF) to recognize the contribution of academic research to
ding of financial- reporting practices. The authors received a $5,000 cash
ored by the Stan Ross Department of Accountancy that was presented at the
F academic conference on November 5, 2004.

THE ACCOUNTING REVIEW
ISSN 0001-4826

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